

**Foreign Exchange Rates and Corporate Performance:**  
*A Study of the Nature, Determinants, and Management of  
Economic Currency Exposure*

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## ABSTRACT

In today's world of volatile currencies and increasing levels of cross-border trade, few companies, if any, are unaffected by movements in foreign exchange rates. This thesis investigates the impact of currency fluctuations on UK non-financial companies. In particular it focuses on their economic exposure, or the impact of unexpected changes in foreign exchange rates on the future cash flows of the firm.

The empirical research presented in this thesis is based on two postal surveys that were distributed to the finance directors of listed UK non-financial companies (in 1996 and 1997) and also interviews conducted with some of the survey respondents. The aim of the research is to discover the direction, magnitude, and causes of the economic exposure faced by UK firms. This thesis takes as its primary focus the investigation of the indirect, or competitive determinants of economic exposure, in addition to the direct exposures arising from the volume of a company's cross-border trade. The study also reports on the extent to which the sample companies are able to make adjustments to their operating policies such as production location, input sourcing and pricing in order to reduce the sensitivity of their cash flows to foreign exchange rate movements.

The principal conclusion of this thesis is that the cash flows of UK companies are less sensitive to changes in foreign exchange rates than the economic exposure theory would suggest. There are two explanations for this finding. The first is that many companies have achieved a natural hedge from currency fluctuations by purchasing a high proportion of their inputs in the foreign currencies they receive for their export sales. A second explanation is that some of the surveyed finance directors may not be aware of the full impact of foreign exchange rates on the competitive position of their companies.

The survey evidence also suggests that the direct sources of economic exposure such as the extent to which a company sells in foreign markets are more significant than the indirect sources such as the geographical location of a company's competitors. Finally, the survey findings show that a large number of companies are willing to make alterations to their operating policies in order to mitigate the effects of unanticipated foreign exchange rate movements.



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## **DECLARATION**

I declare that the contents of this thesis have been composed entirely by myself, that the work contained is my own, and that all contributions from others have been clearly indicated and have been given due reference.

Katrina Diane Bradlěy



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# CHAPTER ONE

## Introduction

*“International companies now know that what happens to the currencies in which they tot up their costs, revenues and assets affects their results as much as their success in making and selling products.” (The Economist, 4 April 1987, p 83)*

Volatile foreign exchange rates are a significant source of concern for many firms, particularly those involved in international trade. Fluctuations in exchange rates not only affect the value of a firm's foreign profits and foreign currency denominated assets and liabilities, they may also have a significant impact on its competitive position. This thesis investigates the extent to which the future cash flows of UK non-financial companies are sensitive to unexpected changes in foreign exchange rates.

### 1.1 Foreign Exchange Rates and the Firm: Background

Countries engage in international trade because they wish to specialise in producing those goods and services at which they are relatively efficient. According to the law of relative competitive advantage, a nation may still import a product where it could be the most efficient producer if it is even more productive in the production of other goods. In the last few years, however, it has become increasingly apparent that success in international trade is not determined by comparative advantages alone. Porter (1989) has emphasised that dynamic factors have become more important than static production abilities because they create *competitive* advantage. The most obvious dynamic factor affecting the competitiveness of exporting companies is uncertainty about foreign exchange rates.

Under the system of fixed exchange rates that existed up until the early 1970s, companies participating in international trade could be fairly certain of the local currency prices they would receive for their exports or would have to pay for their imports. In today's environment of fluctuating foreign exchange rates, however, currency levels can have a significant impact on the competitiveness and profitability of exporting and importing companies. For example, as the value of sterling appreciates relative to other currencies, the price competitiveness of an exporting UK firm will deteriorate, resulting in reduced foreign sales volumes and/or profit margins. In contrast, a firm importing goods into the UK will find that they become less expensive in sterling terms. A depreciation in the value of sterling relative to other currencies will have the opposite effects.

The following extracts from the financial press show how changes in foreign exchange rates can affect the performance of UK companies.

- *British Steel is shedding more than 2,000 of its 50,000 jobs in the first stage of an extended rationalisation programme, designed to offset the impact of sterling. Pre-tax profits, which have fallen from a record £1.1bn in 1995-96 to £451m in 1996-97, are expected by City analysts to drop even further in this financial year. (Financial Times, July 11, 1997, p 15)*
- *Mr Richard Brucciani, managing director of Pal International, a Leicester-based manufacturer of chefs' hats, says he is considering closing his German sales office because of the pound's impact, and handling orders from the UK. He says that a strong pound is welcome to the extent that it reflects underlying strength in the economy. "But what is very damaging is the speed with which this appreciation has come." (Financial Times, July 18 1997, p 15)*
- *Due to the high pound, Telmag is considering moving some of its manufacturing overseas, said Len Shaw, the sales director. "We have held on to some large contracts, but we are running at breakeven, bordering on to losses. We have had the pain of losing [some of] our export business; now the greatest threat is seeing our domestic customers reducing orders because their customers in turn aren't getting export orders any more," Mr Shaw said. (Financial Times, March 20 1998, p12)*
- *Process Scientific Innovations, a maker of high-technology filters in County Durham, says it only broke even in the year to April after sterling's rise wiped £200,000 off*

*profits. Ms Sue Hunter, managing director, says she is considering switching some purchasing to Germany and possibly locating any future expansions overseas. (Financial Times, July 11 1997, p 15)*

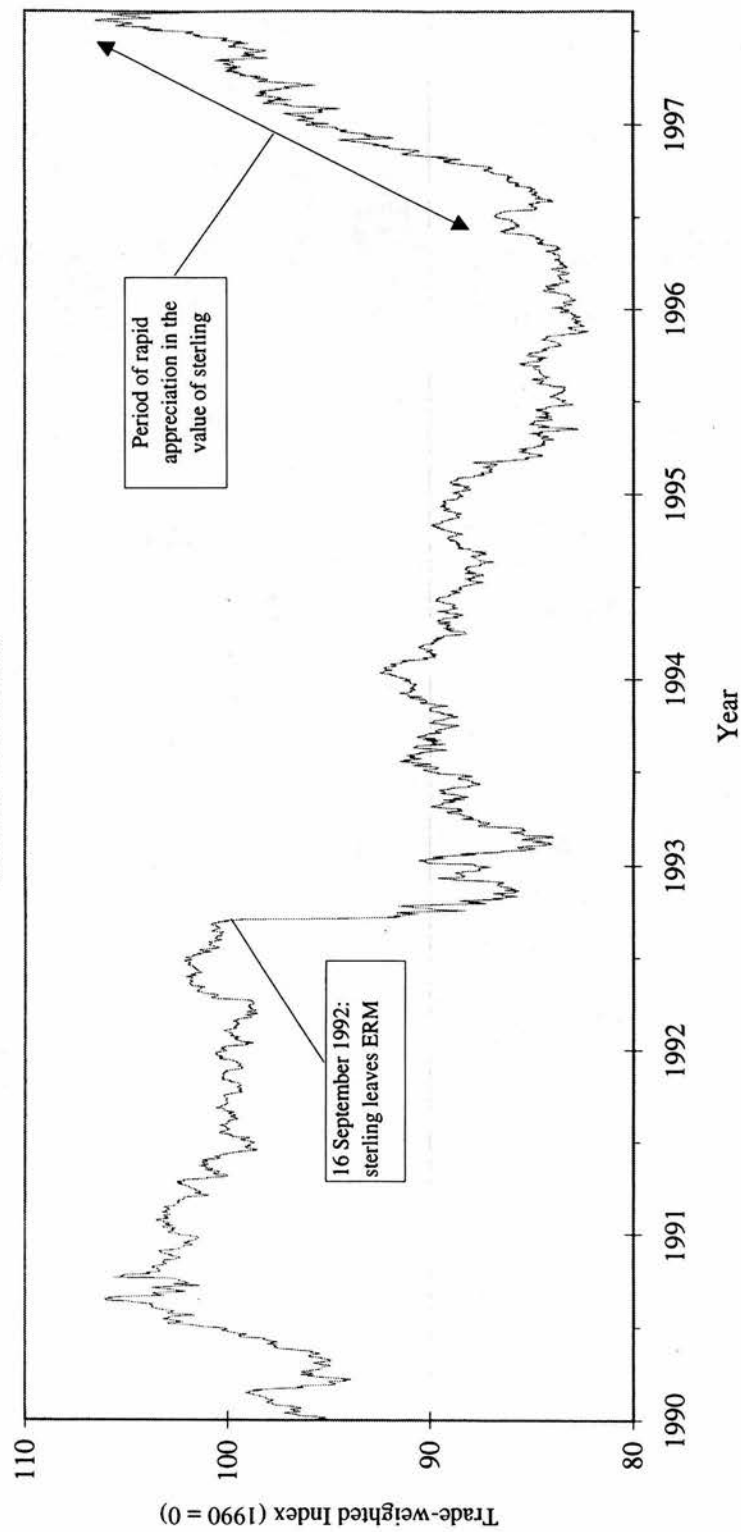
The impact of changes in foreign exchange rates on corporate profitability extends beyond their direct influence on the cash flows associated with foreign trade, however. A company may be exposed to movements in foreign exchange rates even though it has no significant foreign currency cash flows. For example, firms operating entirely within the UK market may be exposed to an appreciation in the value of sterling as a result of the improved price competitiveness of foreign imports. In addition, Pringle (1991) points out that companies with purely domestic operations may find that their profitability is affected by the impact of exchange rate movements on firms at an earlier or later stage in the value chain. Similarly, George & Scroth (1991) maintain that:

*"... virtually every company exposed in some way to the international market place will find its competitive standing altered by major foreign exchange movements." (p 109)*

There have been two recent occasions where the price competitiveness of UK companies has been significantly altered by movements in the value of sterling. As illustrated in Figure 1.1, a large depreciation in the value of sterling occurred following its departure from the European Exchange Rate Mechanism (ERM) in September 1992. This was followed by a period of relative stability from 1993 to 1996. More recently, there has been a sustained period of appreciation in the value of sterling relative to many other currencies. On a trade-weighted basis, the value of sterling increased by around 20 per cent over 12 months beginning in August 1996. Against some currencies, the Deutschmark for example, this appreciation has been considerably greater, at approximately 25 per cent. Not suprisingly, a large number of UK companies have warned that their price competitiveness in international markets has been seriously eroded by this recent appreciation in sterling.

**Figure 1.1: Sterling trade-weighted index 1990-97**

(Source: Datastream)



The various effects of a change in the value of a currency on the future cash flows, and ultimately the profitability, of the firm are captured by the concept of economic exposure. This relates to the degree to which the value of the firm (or the present value of its future cash flows) is affected by unexpected movements in foreign exchange rates. Assessing the economic exposure of a firm is very difficult because it is not restricted to the impact of changing exchange rates on known or expected future foreign currency cash flows. It also incorporates their effect on the firm's ability to generate those foreign currency cash flows. For example, consider the currency exposure faced by a UK company exporting its products to the US, where it faces significant competition from German based firms. In this situation, fluctuations in the US dollar/deutschmark exchange rate may be just as significant as changes in the US dollar/sterling rate.

The magnitude of the of economic exposure faced by a particular company is not determined solely by its level of cross-border trade. Flood & Lessard (1986) postulate that the performance of multinational corporations (that both source and sell in competitive foreign markets) will be less sensitive to changes in foreign exchange rates than those firms engaged solely in exporting or importing. Others have emphasised that the nature of the competitive environment in which the firm operates and the type of product it produces are also important determinants of foreign exchange rate sensitivity. For example, the cash flows of a firm importing coffee (priced in US dollars) for sale in the UK may be immune to movements in the value of the US dollar relative to sterling. This is because all of the firm's competitors in the UK market are affected in a similar way by changes in the US dollar/sterling exchange rate and the firm therefore has a greater ability to pass-on the impact to its customers.

There exists a large body of research that explores how firms may limit the exposure of their future cash flows to changes in foreign exchange rates. Until recently, this has focused on the use of financial instruments such as forward foreign currency contracts. It is now widely believed, however, that the ability of financial instruments to insulate a company from the numerous effects of economic exposure is limited. Glaum (1990)

argues that companies should manage their economic currency exposure by adjusting their operating policies with regard to plant location, input sourcing, pricing and market selection. For example, a company may be able to reduce its sensitivity to changes in foreign exchange rates by sourcing its raw materials in the same currencies it receives for its export sales.

## **1.2 The Aims of the Thesis**

At present, relatively little is known about the magnitude of the economic currency exposures faced by UK companies, or the methods they use to manage these exposures. The purpose of this thesis is to address three interrelated questions. First, how important is the impact of foreign exchange rate movements on the cash flows of UK companies? Second, which company-specific factors are important in determining the magnitude of a firm's exchange rate sensitivity? And finally, to what extent do UK companies attempt to reduce their exchange rate sensitivity by making adjustments to their operating policies and strategies?

These questions are addressed using a postal survey of the finance directors of almost 600 UK non-financial companies. In addition, a follow-up survey distributed a year later enabled the impact of the 1996-97 appreciation in the value of sterling to be investigated. Semi-structured interviews were also conducted with a small number of the survey respondents in order to obtain further in-depth information regarding the determinants of exchange rate sensitivity.

There are two key aspects of the empirical research conducted for this thesis that differ from previous investigations of economic exposure. The first is that it has a wider scope than previous studies which have focused almost exclusively on the economic currency exposure of large multinational corporations (Jorion, 1990; Bodnar & Gentry, 1993; Choi & Prasad, 1995). In this thesis, the exchange rate sensitivity of exporting,



importing and purely domestic firms is also investigated. The second distinguishing feature of this study is that it examines the non-financial determinants of economic exposure. Previous studies have concentrated on financial ratios such as the percentage of foreign to total sales. This approach is simplistic, as it does not take into account the extent to which firms may be protected from the effects of exchange rate fluctuations due to factors such as the nature of the product they produce, or the degree to which their operations are diversified in many different countries.

### **1.3 The Layout of the Thesis**

The thesis begins, in the following chapter, with a review of the theoretical and empirical literature which focuses on the nature and causes of economic exposure. This shows that the literature has developed from an early focus on the economic exposure arising from sourcing and selling in foreign markets to today's emphasis on the competitive determinants of exchange rate sensitivity. This chapter also explains the approach taken in previous studies which have sought to measure the extent to which companies are sensitive to changes in foreign exchange rates.

In chapter 3, the literature relating to the management of economic currency exposure is analysed. Three main techniques for managing economic exposure are compared: hedging the exposure using financial instruments, adjusting the operating policies of the firm, and making alterations to the firm's pricing policies. The chapter shows that despite the theoretical superiority of operational hedging techniques, there exists surprisingly little evidence of the extent to which they are employed by UK companies.

Chapter 4 outlines the research methodology adopted in this thesis. The strengths and weaknesses of the use of postal surveys are addressed and the approach taken in this study to ensure a high response rate is explained. The chapter also presents the results



of a number of statistical tests designed to show whether the respondents to the postal surveys may be regarded as representative of the survey population.

In chapters 5, 6 and 7 of this thesis, the findings of two postal surveys designed to investigate the nature, causes, and management of the economic currency exposure of UK companies are presented. Chapter 5 discusses the survey findings relating to the magnitude of the economic exposure faced by the survey respondents. In addition, the pricing reactions of the surveyed firms to the 1996-97 appreciation in the value of sterling are examined. Chapter 6 investigates the relationships between a number of financial and non-financial company characteristics and the foreign exchange rate sensitivity of the responding firms. Chapter 7 presents the survey findings with respect to the use of operational hedging techniques for the management of economic exposure. Evidence relating to the factors which may prevent the use of such techniques is also presented.

Chapter 8 presents an in-depth analysis of the economic currency exposures faced by six of the responding companies, based on interviews that were conducted with financial executives in each firm. The factors which prevent these companies from using operational hedging techniques for the management of their economic currency exposure are also examined. The final chapter concludes this thesis and makes suggestions for future research.

## **CHAPTER TWO**

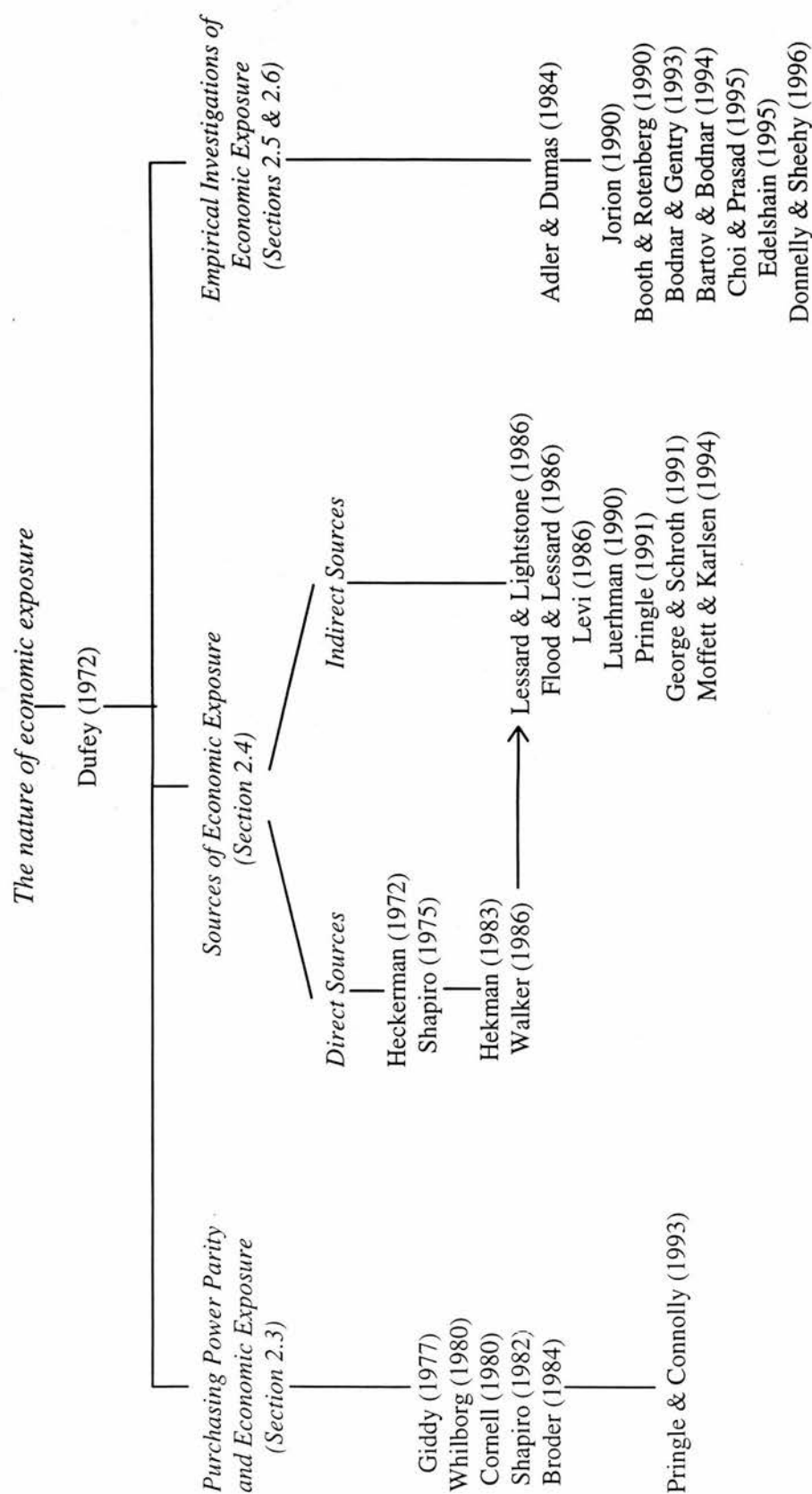
### **The Nature and Causes Of Economic Currency Exposure: A Review Of The Literature**

#### **2.1 Introduction to the Economic Exposure Literature**

Since the breakdown of the Bretton Woods system of fixed exchange rates in the early 1970s, there has been a proliferation in the international financial management literature which seeks to explain the impact of changes in foreign exchange rates on the value of the firm, i.e. 'economic' currency exposure. The purpose of this chapter is to describe and evaluate the theoretical and empirical research relating to the nature and causes of economic exposure.

As illustrated in Figure 2.1, the literature may be categorised as belonging to one of three groups. The first consists of those papers which adopt a macroeconomic perspective by analysing the relationship between exchange rates and inflation, i.e. the theory of purchasing power parity. The second group of research seeks to explain why some companies are more exposed to exchange rates than others, by examining the sources of economic exposure. While the early research focused on the direct sources of economic exposure, i.e. selling and purchasing in foreign markets, recent contributions have recognised the importance of the competitive environment of the firm in determining the magnitude of its economic exposure. The final group comprises a number of empirical studies which have attempted to estimate the economic exposures of companies using share returns and foreign exchange rate data. The vast majority of these studies have been conducted in the US and have found that the returns of only a handful of companies are significantly related to changes in foreign exchange rates. Before analysing the three groups of research, we consider the relative importance of the major forms of currency exposure.

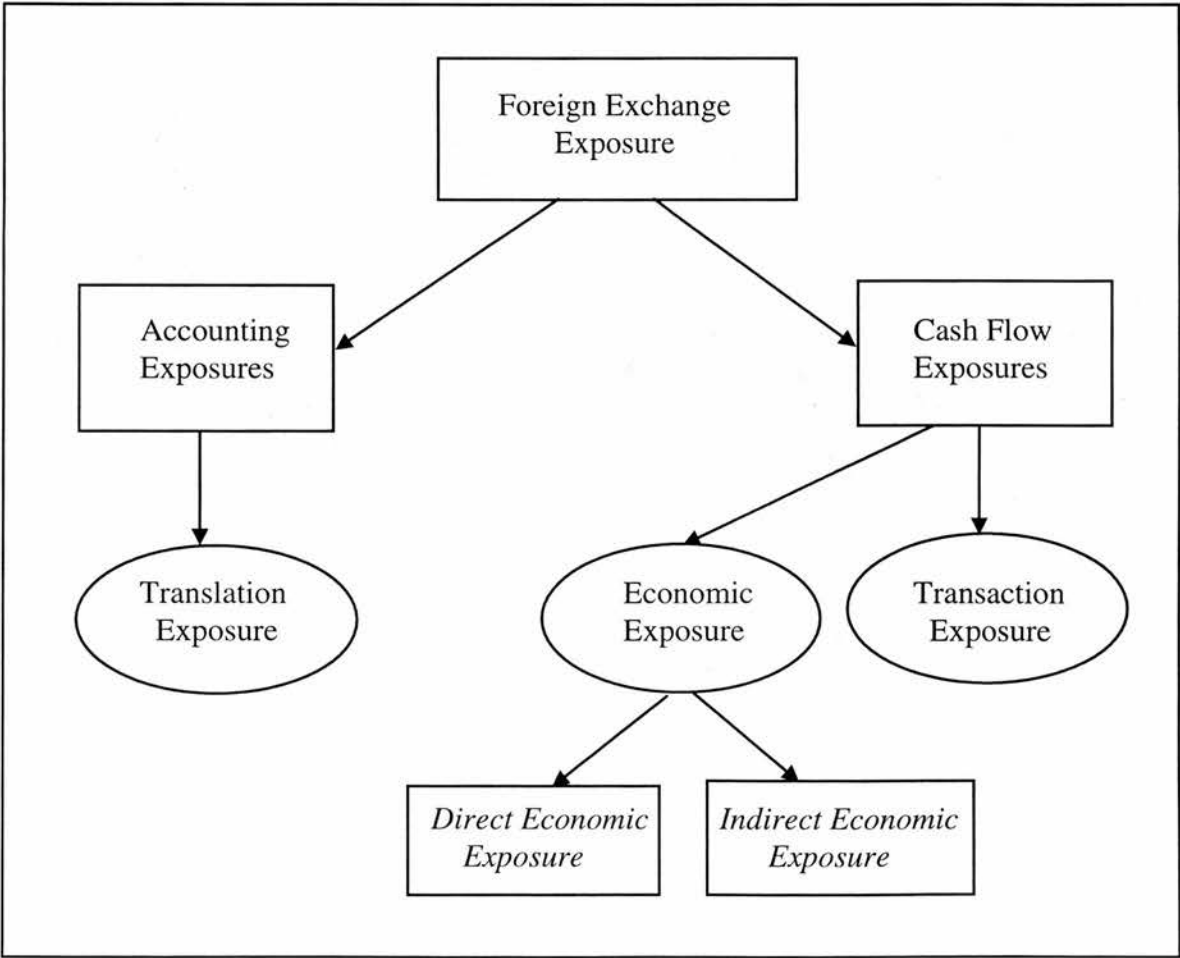
**Figure 2.1: Major research investigating the nature and causes of economic currency exposure**



## 2.2 Forms of Currency Exposure

The effect of a change in exchange rates on the firm has been traditionally measured in three different ways: translation, transaction and economic exposures. As shown in Figure 2.2, transaction and economic exposures represent the impact of exchange rate movements on real cash flows, while translation exposure is purely a financial accounting based risk. While economic exposure is the focus of this thesis, an understanding of the other forms of currency exposure is necessary in order to illustrate why economic exposure is generally regarded as the most effective measure of the impact of foreign exchange rate movements on the firm.

**Figure 2.2: The categories of currency exposure**



### 2.2.1 Translation exposure

Translation exposure captures the accounting effects of exchange rate fluctuations. It has been defined by Eiteman, Stonehill & Moffet (1992, p 172) as the

*“..... potential accounting-derived changes in owners' equity that result from the need to 'translate' foreign currency financial statements of affiliates into a single reporting currency in order to prepare worldwide consolidated financial statements.”*

As a result of the translation process, corporations with foreign subsidiaries find that the assets, liabilities and profits of these businesses are worth less (in the case of a home currency appreciation) or more (when the home currency depreciates) when translated back into home currency. In the UK, this procedure is governed by SSAP 20. Assets and liabilities are translated at current exchange rates and are disclosed as a movements in reserves. In contrast, the profits of foreign subsidiaries may be translated using the weighted average of the exchange rate over the accounting period and the exchange rate effect flows through to the consolidated income statement.

There is a commonly held view that translation exposure is irrelevant because in an efficient market, the accounting effects will be fully discounted by rational investors. Korsvold (1986) points out that accounting statements contain a picture of economic dispositions that a firm has already taken rather than their future consequences. Similarly, Shapiro (1992, p 196) argues that:

*“..... retrospective accounting techniques, no matter how refined, cannot truly account for the economic (that is, cash flow) effects of a devaluation or revaluation on the value of the firm because these effects are primarily prospective in nature.”*

This view is supported by empirical research which shows that investors are able to discriminate between accounting gains and losses and economic reality. Dukes (1978) compared the share returns of approximately 500 US multinational corporations with

the returns of a sample of purely domestic companies. He found that the behaviour of the share returns of the multinational firms, subject to the currency translation reporting requirements of accounting standards, was not significantly different from that of the purely domestic firms. Dukes concluded that the US stock market is not fooled by translation gains and losses. In a similar study, Garlicki, Fabozzi and Fonfeder (1987) studied the effects of the changes in accounting practice resulting from the replacement of FASB 8 with FASB 52 in the early 1980s<sup>1</sup>. They failed to find any abnormal gains or losses in the shares of those companies affected by the change in accounting standards. While similar research is yet to be conducted in the UK, this evidence suggests that managing translation exposure to influence the accounting position of the firm will have no impact on corporate value.

Despite the theoretical and empirical evidence which suggests that translation is irrelevant, a number of surveys of corporate practice have found that it is actively managed by a large number of companies. Collier *et al* (1990) interviewed financial executives in 11 British multinational corporations. Only two of their interviewees agreed that translation exposure does not render useful information to the corporate manager. In the remaining companies, translation exposure was managed for a variety of reasons, including a desire to protect gearing ratios and provide a more accurate reflection of the underlying values in the group balance sheet. The findings of two other surveys conducted by Belk & Glaum (1990) and Belk, Bakay & Duangploy (1993) also suggest that financial executives continue to manage the translation exposure of their companies. This concern with translation gains and losses appears to conflict with the empirical evidence presented by Dukes (1978) and Garlicki *et al* (1987) which suggests investors are able to discriminate between accounting gains and losses and economic reality.

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<sup>1</sup> The primary change under FASB 52 was that the translation gains and losses arising from the conversion of the balance sheets of foreign subsidiaries were accounted for as a movement in reserves as opposed to being included in the profit and loss account.

Three reasons for the relevance of the gains and losses arising from translation exposure have been identified in the literature. First, the impact of accounting currency exposure on the borrowing capacity of the firm. For example, Ross (1990) maintains that translation exposure may have an impact on the cash flows of companies with foreign currency denominated debt by impacting on their debt to equity ratios and therefore their cost of debt. Adopting a similar argument, Buckley (1992) shows that translation exposure may be highly relevant to those companies whose debt covenants may be breached by foreign exchange rate movements.

The second justification for the relevance of translation exposure concerns the impact on firm value of the information signalling of the earnings announcement. For example, Harrigon (1976) and Shapiro (1992) suggest that accounting gains and losses may be relevant to chief executives wishing to generate a smooth pattern of year to year earnings growth. It may be argued, however, that this view conflicts with the empirical research which shows that investors are able to discriminate between accounting gains and losses and economic reality and as such, are not concerned with the impact of foreign exchange rates on the accounting conversion of the net assets and profitability of foreign operations.

A third circumstance where translation exposure is considered relevant is presented by Buckley (1992). He maintains that concern with translation exposure may be justified when the consolidated results of a multinational corporation show a drop in reported earnings even though trading results have improved in the local currency terms of subsidiaries. While such a consideration may be warranted in relation to the remittances of the earnings of foreign operations in the form of dividends and royalty payments, it is more difficult to accept that a concern for the accounting losses arising merely from conversion is justifiable.

### 2.2.2 Cash flow exposures

Cash flow exposures can be broken down into transaction exposure and economic exposure. Transaction exposure, the short term element, arises when a company has amounts payable or receivable which are denominated in foreign currencies. It is defined by Eiteman, Stonehill & Moffet (1992, p 172) as:

*“... changes in the value of outstanding financial obligations incurred prior to a change in exchange rates but not due to be settled until after the exchange rates change.”*

While transaction exposure concentrates on those cash flows which require an actual conversion of currencies, economic exposure is a much broader concept. It relates to the extent to which unexpected movements in foreign exchange rates alter the present value of the expected future cash flows of the firm. Economic exposure incorporates the impact of exchange rate movements on the entire operations of the firm, including its prices, costs, the demand for its products and ultimately, its competitive position. Therefore it is often referred to as ‘operating’ exposure (e.g. Flood & Lessard, 1986, Shapiro, 1992).

There are two main factors which distinguish the economic effects of exchange rate movements from the transaction effects. The first is that economic exposure goes beyond the exposure of booked transactions and recognises that future, potential cash flows are also affected by changes in foreign exchange rates (Glaum, 1990). Even those cash flows which are not denominated in foreign currency may be exposed. As identified by Rodriguez and Carter (1984, p 322), economic exposure *“measures exchange rate fluctuations on all operational cash flows regardless of whether an exchange transaction is required.”* This form of currency exposure therefore encompasses the impact of exchange rate movements on the domestic sales and purchases of the firm and the foreign sales which are denominated in the company’s home currency.



The second distinguishing factor identified in the literature is that in contrast to transaction exposure, where the only source of uncertainty is the exchange rate at which the cash flows will be converted, economic exposure recognises that even the *foreign currency* cash flows themselves are uncertain (Srinivasulu, 1981). As pointed out by Flood and Lessard (1986), there is not a one-for-one relationship between local currency cash flows and exchange rates because foreign currency cash flows are also a function of the exchange rate. This characteristic of economic exposure is the focus of the analysis presented by Dufey (1972) in which he comments:

*“Local currency revenue and cost streams will not follow the pattern projected before the devaluation ..... a uniform indiscriminate application of the devaluation percentage to the projected predevaluation flow gives an inaccurate picture”* (Dufey, 1972, p 48).

For example, Dufey points out that following a devaluation in its home currency, it is unlikely that the cash flows received by an exporter invoicing in foreign currency will be increased by the full devaluation percentage. This is because the competitive response of other exporters may force the company to reduce its foreign currency prices.

### **2.2.3 Strategic currency exposure**

Several researchers have recently proposed that economic exposure is only a part of the overall *strategic* exposure faced by the firm. This literature is relatively limited, but generally seeks to widen the scope of the traditional definitions of economic currency exposure. *Strategic* exposure is defined by Rawls and Smithson (1990) as the extent to which changes in foreign exchange rates, interest rates or commodity prices affect the present value of the expected future cash flows of the firm. Oxelheim and Wihlborg (1989a and 1989b) and Buckley (1992) propose a wider definition of strategic exposure, which they refer to as *macroeconomic* exposure. This definition also takes into account the exposure of the firm to changes in inflation rates and wage levels:

*“Macroeconomic exposure is concerned with how a firm’s cash flows, profit and hence value change as a result of developments in the economic environment as a whole - that is, within the total framework of exchange rates, interest rates, inflation rates, wage levels, commodity price levels and other shocks to the system.” (Buckley, 1992, p 451)*

There are two major difficulties which arise in the application of the strategic exposure concept. Firstly, it may be difficult to accurately measure and define all of the variables necessary in order to estimate a firm’s strategic exposure, particularly for those multinational corporations which operate in many different economies. Secondly, using the strategic definition of exposure may encourage firms to adopt a long term view, by relying on macroeconomic relationships as a natural hedge, thus exposing the firm to the risk arising from short term departures from such relationships.

Despite these drawbacks, there is evidence to suggest that some corporations are beginning to consider the strategic exposure they face. Case studies have been published by treasury executives at a number of corporations, including Rio-Tinto Zinc Corporation (Lighterness, 1987), Western Mining (Maloney, 1990) and Vulcan Materials Company (Garner and Shapiro, 1984). It should be noted, however, that these case studies are largely based on resource-based corporations. Due to the existence of world market prices for the output of such companies, the relationship between their profitability and various macroeconomic factors is likely to be more straightforward to examine than for other companies.

As a result of the review of the literature presented in this section, it can be seen that the ‘economic’ definition of currency exposure is the most complete. This is because economic exposure considers the impact of foreign exchange rate movements on *all* of the company’s future cash flows. This form of currency exposure is therefore consistent with the objective of maximising the value of the firm. In addition, economic exposure recognises that movements in foreign exchange rates can alter the entire operations of the firm. The following two sections of this chapter review the literature which explains the macroeconomic and company-specific determinants of economic exposure.

## 2.3 Purchasing Power Parity and Economic Exposure

It is now widely accepted in the literature that economic exposure can only arise under two circumstances: as a result of a change in the real (inflation adjusted) exchange rate, or where the prices of the outputs and inputs of a particular company do not move in line with the general rate of inflation. Giddy (1977) was one of the first to emphasise the importance of inflation in the determination of economic exposure:

*“If gains and losses from exchange rate changes tend over time to be offset by differences in relative inflation rates, it matters little in which currency the firm buys its inputs or sells its products, since the devaluation (revaluation) of a foreign currency will sooner or later be offset by a correspondingly higher (lower) rate of inflation in that currency.”* (Giddy, 1977, p 25)

The theory which Giddy implicitly relies upon in his analysis is that of purchasing power parity. This states, in its relative form, that a change in the relative inflation rates of two countries will be offset by a movement in the exchange rate between the two currencies, i.e.

$$e_t / e_0 = (1 + i_h)^t / (1 + i_f)^t \quad (1)$$

Where  $e_0$  is the exchange rate at beginning of the period,  $e_t$  is the exchange rate in period  $t$ ,  $i_h$  is the rate of inflation in the home country and  $i_f$  is the rate of inflation in the foreign country. The foundation of this theory appears in the work of Cassel (1918, p 413) in which he points out that general price levels in different countries are connected via the prices of internationally traded goods. Cassel explains that if the price level rises at a faster rate in one country than in another, commodity arbitrage will lead to a change in the exchange rate and hence the prices of traded goods so that price parity between the two countries is restored.

Giddy's (1977) analysis appears to imply that companies are insulated from economic exposure as a result of the Purchasing Power Parity relationship between inflation and foreign exchange rates. It is now agreed, however, that substantial economic exposure

can arise not only when there are deviations from the purchasing power parity relationship, but also as a result of relative price changes. These occur when the prices of a company's output and inputs do not move in line with the general rate of inflation. In the remainder of the chapter, the literature addressing these two macroeconomic sources of economic exposure is explained.

### 2.3.1 Deviations from purchasing power parity

There exists a large body of research in the international economics literature which investigates whether the relative purchasing power parity relationship holds in reality. It is not the purpose of this section to conduct an extensive review of this literature<sup>2</sup>. Rather, a brief summary of the major empirical tests and their findings is presented, in order to illustrate why we can expect companies to experience substantial economic exposure.

Prior to the mid-1980s, researchers focused on determining whether purchasing power parity (PPP) held in the short-run. Generally speaking, their findings suggest that changes in price levels do not offset movements in exchange rates on a monthly or even an annual basis. The majority of these studies used ordinary or generalised least squares regression to estimate the following equation:

$$S_t = \alpha + \beta(p_t - p_t^*) + e_t \quad (2)$$

Where  $S_t$  is the time- $t$  domestic currency price of foreign exchange,  $p_t$  is the time- $t$  domestic price level and  $p_t^*$  is the time- $t$  foreign price level. Estimates of  $\beta = 1$  would suggest that relative PPP holds in the short run. Using equation (2), Frenkel (1981) found that purchasing power parity performed poorly for a number of industrialised nations in the 1970s. The majority of his  $\beta$  estimates were far from 1.0 and a number

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<sup>2</sup> Two recent extensive reviews of the empirical purchasing power parity literature have been conducted by Isard (1995) and Froot & Rogoff (1995).

exceeded 2.0. Frenkel suggested that factors such as temporary real shocks and sticky goods prices prevent finding betas equal to one. A number of other short-run studies also report that PPP fails to hold as a short run relationship, for example, Aliber & Stickney (1975), Isard (1977), Krugman (1978) and Milone (1986).

In the mid-1980s, researchers began to focus on examining the long run validity of PPP by testing whether or not real exchange rates follow a random walk. The implications of this research is summarised by Abuaf & Jorion (1990), who conclude:

*“If true, the random walk hypothesis has the disturbing implication that shocks to the real exchange rate are never reversed, which clearly implies that there is no tendency for PPP to hold in the long run.”* (Abuaf & Jorion, 1990, p 157)

The random walk hypothesis is therefore based on the important assumption that there is a *constant mean level* of the real exchange rate at which purchasing power parity is maintained. If the tests of this hypothesis find evidence that there is no tendency for changes in real exchange rates to be reversed over time, this would suggest that purchasing power parity does not hold in the long run.

A number of the early studies were unable to reject the null hypothesis that the real exchange rate follows a random walk, for example Adler & Lehmann (1983) and Hakkio (1986). However, beginning with the work of Edison (1987), it was recognised that these results reflected the poor statistical methodology employed in the early tests rather than evidence against long run PPP. As explained by Froot and Rogoff (1995), the difficulty faced by researchers testing the long run validity of PPP is that convergence to PPP is relatively slow and it is not easy to distinguish between a real exchange rate which is following a random walk and a stationary one which reverts to its mean level very slowly.

Subsequently, a number of studies focusing on long data periods (e.g. Abuaf & Jorion, 1990; Edison, 1987) and/or using advanced econometric techniques (e.g. Mark, 1990;

Grilli & Kaminsky, 1991; Glen, 1992) have found that real exchange rates do not follow a random walk and display tendencies to revert towards their means. But the time scales involved can be quite substantial. For example, in their study of 10 industrialised nations for the years 1973-1987, Abuaf & Joiron (1990) conclude that a 50 per cent overappreciation with respect to PPP would take between three and five years to be cut in half.

The evidence obtained in these studies therefore suggests that purchasing power parity does hold in the long run, albeit with substantial time lags. There are serious implications of these findings for economic currency exposure. Companies are not automatically insulated from movements in foreign exchange rates by offsetting changes in relative inflation rates. Indeed, it may take many years for the real exchange rate to revert to its PPP level. Companies may therefore be exposed to the economic effects of exchange rate movements for long periods of time. In the words of Pringle & Connolly (1993, p 63):

*“While economists may argue about whether there is a long-run tendency toward absolute PPP, what is likely to matter for managers is relative PPP during the short- and medium-term. In the long run, to echo Keynes, the firm may be dead.”*

### **2.3.2 Relative price changes**

Even if the relative PPP relationship were to hold continuously for an economy as a whole, it would still be possible for individual companies to experience economic exposure as a result of relative price risk. This arises where the prices of a company's outputs and inputs do not move in line with the general rate of inflation. For example, if the wholesale price index rises by 5 per cent, the price of oil may increase by 8 per cent and the price of electronic goods by only 2 per cent.



Early papers discussing the implications of the purchasing power parity relationship for economic exposure, for example Giddy (1977) and Walker (1978), failed to acknowledge relative price risk. They maintained that where exchange rate changes are offset by changes in inflation rates, economic exposure simply ceases to exist. In the early 1980s, there was considerable confusion in the literature as to whether relative price risk could be considered a component of foreign exchange risk. Cornell (1980) and Shapiro (1982) maintained that relative price changes alone do not lead to economic exposure. They considered that only deviations from the purchasing power parity relationship could lead to economic exposure, as relative price changes could not be regarded as an purely international phenomenon:

*“These so called exchange rate effects are really relative price effects and are therefore little different from the relative price effects that must be considered domestically. Thus, unless exchange rate changes themselves lead to relative price changes, what is usually termed ‘exchange risk’ may just be the risk of relative price changes within and between countries.”* (Shapiro, 1982, p 119)

In contrast to the approach taken by Cornell and Shapiro, Wihlborg (1980) maintained that in order for economic exposure to be avoided, not only was it necessary for the relative purchasing power parity relationship to be maintained, but in addition, relative price changes could not arise (a concept he refers to as ‘neutral inflation’). Wihlborg therefore argued that relative price risk could be regarded as a component of economic exposure.

Broder (1984) also considers that relative price changes are an important component of economic currency exposure. He points out that deviations from purchasing power parity often give rise to relative price risk, particularly when such departures lead to market share adjustments, production level changes and price adjustments. More recently, Pringle and Connolly (1993) have pointed out that for a firm to be completely insulated from the effects of economic exposure, relative prices must remain constant not only for the firm, but also for its competitors, customers, and suppliers.

## 2.4 The Sources of Economic Exposure

Even in the presence of deviations from purchasing power parity and relative price changes, the cash flows of some companies will be highly sensitive to foreign exchange rate movements, while those of other companies will hardly be affected at all. This is because the magnitude of a company's economic exposure depends on the specific nature of its operations. Unlike the translation and transaction forms of currency exposure, which can be determined using accounting information, an *ex ante* measurement of economic exposure cannot be obtained in this way. This is because future cash flows are uncertain and are therefore not captured by current accounting statements.

As a result of these measurement difficulties, a number of researchers have focused on examining the sources or 'determinants' of economic currency exposure. The most obvious source of economic exposure comes from having revenue or cost streams denominated in foreign currencies. These can arise when a company sources, sells, produces or finances in foreign markets. Clearly, these *direct* sources of economic exposure are relatively easy to identify. On the other hand, there exist a number of *indirect* sources of economic exposure which can be just as important, but substantially more difficult to recognise. Moreover, these indirect sources of exposure can 'double-up' or diminish the economic exposure arising as a result of a company's foreign currency revenue or cost streams. The following section explains the early research which focuses on the direct sources of economic exposure, while section 2.4.2 addresses the indirect sources.



### **2.4.1 Direct sources of economic exposure**

The earliest attempts to identify the sources of economic exposure consisted of economic models which were designed to illustrate the impact of foreign exchange rate movements on the value of foreign subsidiaries. The first and most simplistic attempt to model the direct sources of economic exposure was presented by Heckerman (1972). He provides a quantitative definition of the combined impact of changing foreign price levels and exchange rates on the value of the foreign operations of a company.

Heckerman's analysis is limited in two ways. Firstly, he does not incorporate the changes in production and sales volumes which are likely to occur following a movement in exchange rates. For example, following a depreciation in its home currency, a company selling in foreign markets may either keep its market share relatively constant by allowing its prices to rise in home currency terms, or, it may use its cost advantage to reduce its foreign currency prices, thereby increasing its market share. Heckerman's analysis implicitly assumes that companies adopt the former strategy. The second limitation of Heckerman's paper is that he assumes the firm does not face any competition from foreign companies in either its domestic or foreign markets. His model of economic exposure therefore does not incorporate the impact of foreign exchange rate changes on domestic and foreign sales which arise as a result of the altered competitiveness of foreign based competitors.

Shapiro (1975) extends Heckerman's analysis by assuming that sales volumes and not only selling prices (in local currency terms) are variable as a result of changes in foreign exchange rates. Shapiro analyses the impact of a devaluation in the home currency of the overseas subsidiary of a multinational corporation which sells its output both locally and abroad. He concludes that the profitability of an exporting firm will increase as a result of a devaluation in its home currency, while the profitability of a firm which faces competition from foreign imports will also increase. It is the latter conclusion which is the most significant contribution made by Shapiro. He recognises that a devaluation in

the domestic currency of a company may increase its domestic sales revenues, depending on two factors. First, the degree of foreign competition faced by the company and second, the willingness of overseas exporters to suffer a decline in the home currency equivalent of their foreign selling prices. The second factor is referred to in the international economics literature as the concept of exchange rate 'pass-through'<sup>3</sup>, which refers to the extent to which foreign exchange rate changes are passed onto customers in the form of price changes.

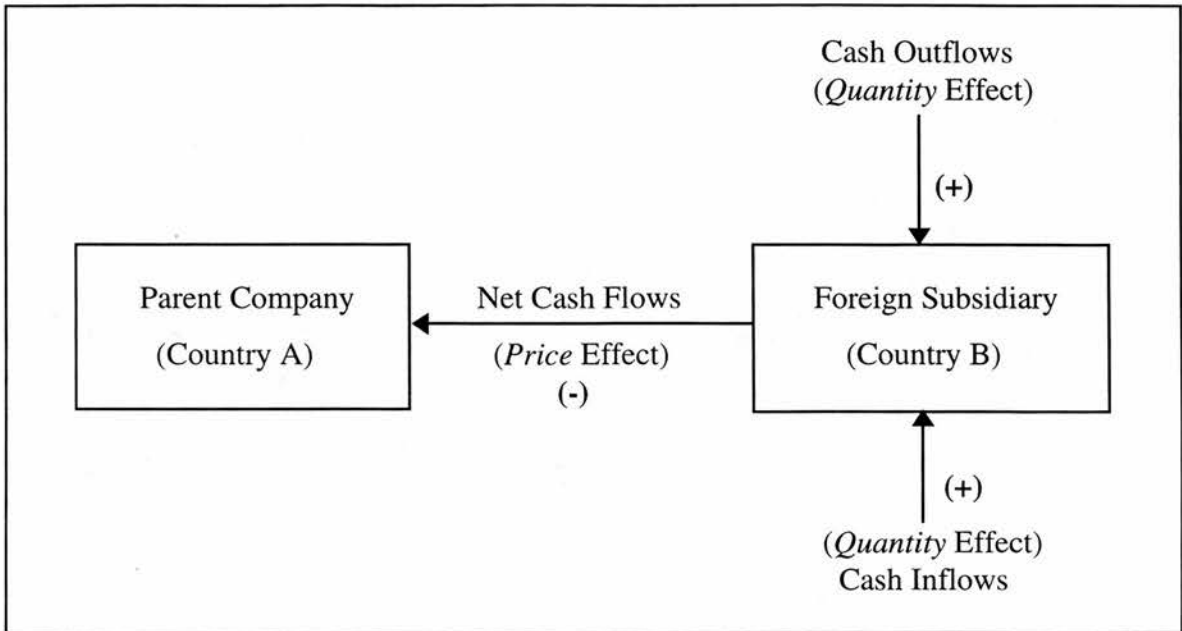
While Shapiro recognises the importance of pass-through for the exchange rate sensitivity of a company's domestic sales revenues, he assumes that the price of the firm's exports (in foreign currency terms) remain constant following a movement in exchange rates. He therefore fails to incorporate the pricing adjustments which can be expected to follow a movement in exchange rates. For example, following a devaluation in its home currency, a company faces the choice of reducing its foreign currency prices (which may lead to higher export sales volumes), or maintaining constant foreign currency prices thereby increasing its home currency revenue per unit sold. This choice may be very significant for the economic exposure of the company because if it does not reduce its prices in foreign currency terms, but its competitors do, it may suffer a decline in its foreign market share.

A more comprehensive model of the direct sources of economic exposure was presented by Walker (1986). As in the analyses of Heckerman and Shapiro, Walker concentrates on the economic exposure of the foreign subsidiary of a multinational firm. He analyses the effect of a devaluation in the local currency of the subsidiary, which consists of two components: the 'price' effect, which relates to the translation of the foreign subsidiary's net cash flows into the home currency of the parent company, and the 'quantity' effect, which describes the changes which occur in the local currency cash flows of the subsidiary as a result of a movement in exchange rates. Walker's approach may be summarised as follows:

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<sup>3</sup> A discussion of exchange rate pass-through is presented in Chapter 3 (section 3.4.2).

**Figure 2.3: The impact of a devaluation in the currency of a foreign subsidiary**



Walker identifies five different 'quantity' effects of a devaluation in the home currency of a foreign subsidiary<sup>4</sup>. These are as follows:

**1. Cash Inflows: Export Sales Revenues** - the home currency<sup>5</sup> value of the export revenues of the foreign subsidiary will be increased. The subsidiary may either reduce its foreign currency selling price by the devaluation percentage, which should lead to higher export sales volumes, or it can maintain its foreign currency prices, increasing the local currency revenue per unit by the devaluation percentage.

**2. Cash Inflows: Domestic Market, Import Competing Sector** - where the subsidiary sells goods which compete with imports in its domestic market, sales revenues should increase, unless importers are willing to suffer a fall in revenue denominated in their own currencies. This favourable effect may be offset by a reduction in real income as a result of the rising price of imports in the devaluing country.

<sup>4</sup> A similar classification of the sources of economic exposure is given by Buckley (1988).

<sup>5</sup> 'Home currency' refers to the home currency of the foreign subsidiary.

**3. Cash Inflows: Purely Domestic Market** - the subsidiary may suffer a fall in sales revenues as a result of the adverse domestic income effect identified above.

**4. Cash Outflows: Real Input Costs** - the costs of imported inputs will increase, however, they may not rise by the full devaluation percentage if the competition from domestic producers forces overseas suppliers to absorb part of the cost increase. The cost of domestic inputs may also increase as a result of expansion in the export and import competing sectors.

**5. Cash Outflows: Financial Costs** - the working capital requirements of the subsidiary may increase as a result of increased sales revenues and higher input costs. The devaluation will also raise the local currency equivalent of the interest rate on foreign currency denominated loans.

While Walker offers a comprehensive analysis of what he refers to as the 'quantity' effects of exchange rate movements, he appears to be confusing the translation and economic aspects of currency exposure. In reality, his 'price' effect relates to the translation exposure arising from the need to convert the profits and losses of foreign subsidiaries into the home currency of the parent company for financial reporting purposes. This effect does not therefore constitute economic exposure. It is only the cash flows which are *repatriated* to the parent company in the form of royalties or dividends which are exposed to exchange rate movements in the economic sense.

### 2.4.2 Indirect sources of economic exposure

The problem with the research which addresses only the direct sources of economic exposure is that the firm is viewed in isolation from its customers, suppliers and competitors. However, the reactions of competitors, customers and suppliers to a movement in foreign exchange rates can be as significant as the extent to which a company sells and sources in foreign markets in determining its economic exposure.

Flood & Lessard (1986) were the first to explicitly acknowledge the importance of the nature of a firm's competition in the determination of its economic exposure. They separate economic exposure into two components: a *competitive* effect and a *conversion* effect, which they define as follows.

*"The competitive effect is the sensitivity of the local currency cash flows to changes in the exchange rate, which is shown to depend on the competitive structure of the markets in which the firm sells its products and the sources of its inputs. The conversion effect is purely the one-for-one mapping of the resulting local currency cash flows into dollars."* (Flood & Lessard, 1986, p 26)

Flood & Lessard explain that while those cash flows which are denominated in the home currency of a company are not subject to the conversion effect, they may be subject to a competitive effect. It is the competitive effect which forms the basis of their analysis. They emphasise that it is the structure of the markets in which the company operates and not the currency in which a company's sales and costs are invoiced which determines the magnitude of its economic exposure. Another important contribution made by Flood & Lessard's analysis is that it addresses the sources of economic exposure of companies other than those that own foreign subsidiaries. They assign companies to one of four categories as shown in Figure 2.4.

**Figure 2.4: A matrix for the estimation of economic exposure<sup>6</sup>**

		Sensitivity of Costs to Exchange Rate Changes	
		Low	High
Sensitivity of Prices to Exchange Rate Changes	Low	Local Market' Firms	'Importers'
	High	'Exporters'	'World Market' Firms

*Local market* firms are those which source and sell only in local markets at local prices. Such firms are protected from foreign competition by barriers such as transportation costs. *Importer* firms are those which source in competitive world markets but sell mainly in local markets. *Exporter* firms are those which source in local markets but sell their output in competitive world markets. This category may include those purely domestic firms which face significant foreign competition in their selling markets. *World market* firms are those which source and sell in competitive world markets. This may include importer firms whose competitors face similar currency exposures, e.g. wine importers. Note that the classification of companies does not depend on the physical location of its sales and purchases, but on the types of markets in which its prices and costs are determined.

<sup>6</sup> Adapted from Lessard and Lightstone (1986)

According to this matrix, those companies which have a mismatch between their cost and price sensitivities, i.e. 'exporter' and 'importer' firms, face the greatest degree of economic exposure. On the other hand, the cash flows of 'world market' firms, which consist of offsetting cost and price sensitivities will be less sensitive to movements in foreign exchange rates.

In the late 1980s, a number researchers (e.g. Buckley, 1988; Dickins, 1988 and von Ungern-Sternberg & von Weizacker, 1990) began to consider the indirect sources of economic exposure arising impact of exchange rate changes on the foreign competitors of the firm. The observation which forms the basis of these discussions is that a movement in foreign exchange rates may alter the competitiveness of a company as a result of the direct impact on the cash flows of competitors, rather than on the cash flows of the company itself. For example Buckley (1988) details the example of a UK based food and drinks manufacturer which hedges against exchange rate movements which are favourable to its main continental European competitors, based in Spain. George & Schroth (1991) explain the significance of the impact of exchange rate movements on the competitors of the firm as follows:

*"In most businesses, ..... relative exposure, how a company's exposure differs from that of its major competitor is a real concern. Traditional definitions of exposure concentrate solely on foreign currency flows that relate to the company's own operations ..... This internal focus totally ignores the fact that an unfavourable currency movement may not just be unfavourable; it could also be favourable to the competition."* (George & Schroth, 1991, p 109)

In a similar vein, Luehrman (1990) considers the indirect economic exposure arising from the reaction of competitors to movements in foreign exchange rates. He presents a model of economic exposure based on a two-country, two-firm model in which each company manufactures only in its home country and produces a homogeneous product. He derives an equation for the sources of economic currency exposure which consists of three components. First, the conversion of revenue cash flows arising from sales in foreign markets, as contained in the models presented by Heckerman (1972) and



Shapiro (1975). Second, the exchange rate-induced demand changes which arise as a result of the dependence of quantity demanded on the exchange rate. For example, the currency exposure arising from a decrease in the numbers of foreign tourists visiting a country following an appreciation in the value of its currency.

The third component is referred to as 'strategic interaction', which describes the process whereby one firm's currency exposure depends on the other firm's response in the market to a movement in foreign exchange rates. For example, following an appreciation in the home currency of a company, the strategic interaction component of its economic exposure will depend on whether its foreign competitor will pursue higher prices or increased market share in the company's home market. Luehrman explains that this component of economic exposure may offset or reinforce the economic exposure arising from the conversion of foreign currency cash flows and exchange rate-induced changes in demand.

Pringle (1991) extends the competitive analysis presented by Luehrman (1990) to include the indirect impact of movements in foreign exchange rates on the suppliers of the firm. He points out that a company may be exposed to the impact of exchange rate movements on companies earlier in the value chain.

*"A company's products may become more or less competitive in international markets as real exchange rates change. But foreign exchange movements also affect competitors and thus the extent of the impact on pricing depends on how those competitors react. A company's suppliers may also be affected and then attempt to pass along the effect in their prices. The impact on suppliers depends on the competitive structure in their industries, on their (the suppliers') competitors and suppliers and so on." (Pringle, 1991, p 76)*

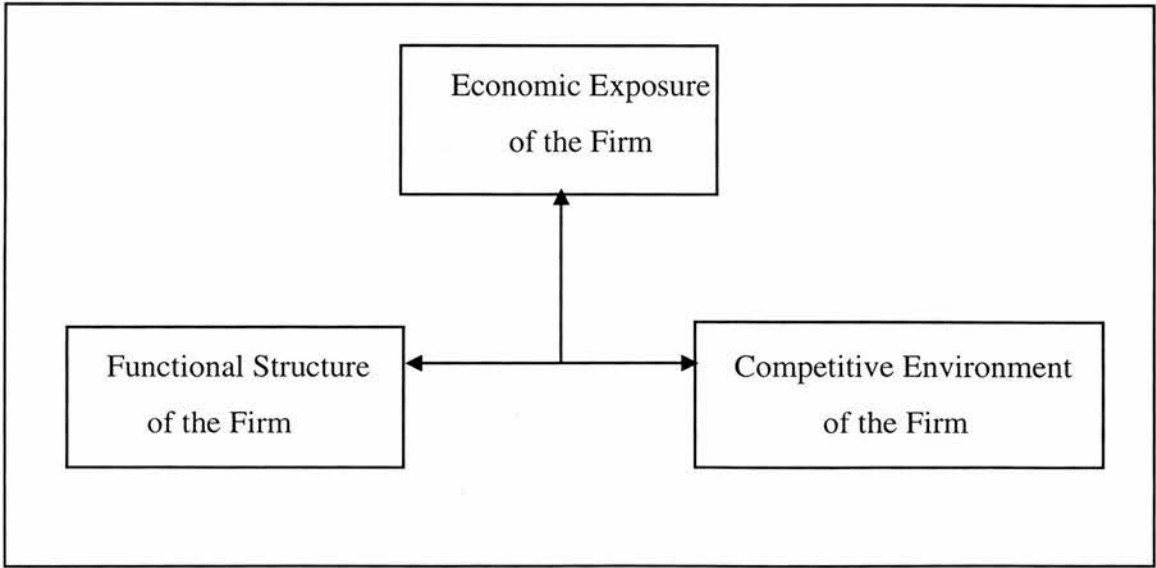


### 2.4.3 Models incorporating the indirect and direct sources of economic exposure

A framework which considers both the direct and indirect sources of exposure is presented by Moffet & Karlsen (1994). They identify two components of economic exposure, which are shown in Figure 2.5. The first, the firm's 'functional structure', relates to the degree to which the firm is diversified internationally, i.e. the extent to which it sells, sources, finances and produces in foreign markets. The second, the 'competitive environment', incorporates the nature of the markets in which the firm sells its output. This component is similar to the *competitive* effect recognised by Flood & Lessard (1986). Moffet & Karlsen explain their framework as follows:

*"The subject firm's exposure is as much an exposure to competitors as it is an exposure to the market ..... the actual exposure of any individual firm is dependent not only on its own structure and operations, but on the competitive response of competing firms to these same unexpected exchange rate changes. And their response is in turn dictated by their functional structure."* (Moffet & Karlsen, 1994, p 163)

**Figure 2.5: A framework of the sources of economic exposure<sup>7</sup>**



<sup>7</sup> Adapted from Moffett and Karlsen (1994)

According to Moffet & Karlsen, there are three main types of competitive environment. The first, which they refer to as the *fixed share* market, relates to the situation where consumer prices are regulated, the pharmaceuticals industry being an obvious example. The economic exposure faced by companies operating in such markets is highly predictable because it is not possible for companies to pass-on the effects of foreign exchange rate movements to customers in the form of price changes. The second type, the *non-differentiated goods* market, refers to those markets in which the products sold are homogenous. In this type of market, Moffet & Karlsen explain that the economic exposure of a firm is determined by the extent to which the international diversification and structure of its competitors are similar.

The third type of market is the *niche goods* market. The products sold in such markets are highly differentiated and therefore provide companies with price-setting ability. The economic exposure faced by a company operating in such a market is highly uncertain and depends on the extent to which the company's products are differentiated from those of its competitors and also the pricing response of competitors to a movement in foreign exchange rates. Moffet & Karlsen fail to acknowledge, however, that a company which produces a highly differentiated product may face little or no economic exposure. This is because, as emphasised by Demirag & Goddard (1994), the more distinct a company's product, the greater the possibility that it can alter its prices in order to maintain stable cash flows following a movement in foreign exchange rates.

While Moffet & Karlsen provide a useful framework for the analysis of the indirect sources of economic exposure, their treatment of the indirect sources is more limited. According to their framework, those companies which both source and sell in foreign markets face a similar level of economic exposure to those companies which only import or only export. This is inconsistent with the matrix developed by Flood & Lessard (1986), which illustrates that the exchange rate sensitivity of the cash flows of importing and exporting firms is considerably higher than that experienced by *world market* firms.

By taking into account the indirect sources of economic exposure proposed by Moffet & Karlsen, Luehrman and others, Edelshain (1995) builds on the categories of the direct sources of economic exposure proposed by Walker (1986). He identifies five sources of economic exposure, each comprising two elements, as follows:

**1. Supply exposures.** *Local currency supply exposure* - the impact of exchange rate movements on inputs which are priced in the home currency of the company. *Foreign currency supply exposure* - the impact of exchange rate changes on the home currency prices of inputs which are invoiced in foreign currencies.

**2. Revenue exposures.** *Elasticity of demand exposure* - the changes in quantity demanded which arise following a movement in exchange rates. This form of exposure may occur when the company prices in its domestic currency or when it adjusts its foreign currency prices in order to maintain stable profit margins. *Demand side margin exposure* - arises when the foreign currency prices of the firm are not adjusted following a change in exchange rates.

**3. Competitive exposures.** *Competitive supply exposure* - the changes in market share which result from a company having a different currency profile of costs from those of its competitors. *Competitive demand exposure* - changes in market share resulting from a company having a different currency profile of sales from its competitors.

**4. Value chain exposures.** *Supply chain exposure* - the impact of exchange rate movements on firms earlier in the value chain, which is passed-on to the company. *Demand chain exposure* - the currency exposure of those firms further down the supply chain which results in a 'knock-on' effect.

**5. Quasi-economic exposures.** *Long-term contract exposure* - the currency exposure arising from the uncertainty regarding when a particular contractual amount will be paid. *Quasi-contractual exposure* - arises when a firm tenders for a contract and is

bound by the contract if it is accepted, or when the company is bound by its own published price lists.

The above framework proposed by Edelshain illustrates the complexity involved in assessing the overall economic exposure of a company. The sensitivity of a company's cash flows to movements in foreign exchange rates is comprised of a number of price and volume effects which, while they may be significant when considered in isolation, more often than not offset each other. It can be seen that assessing the economic exposure of a company which operates through many subsidiaries and sells many different products in many different countries can quickly become a highly complex task. It is therefore not surprising that Belk & Glaum (1990) report that a number of financial executives of UK multinational corporations are unsure about the nature of the economic exposure they face.

This section has shown that the literature discussing the sources of economic exposure has evolved in the past 25 years from an initial focus on the impact of currency changes on the home currency values of the cash flows of foreign subsidiaries, to the subsequent focus on the effect of currency fluctuations on the domestic operations of the firm and most recently, to the focus on the impact of foreign exchange rate movements on the competitive environment in which the company operates. The empirical research which has examined the nature and determinants of economic exposure is explained in the following two sections. These studies have focused almost exclusively on the direct sources of economic exposure.

## 2.5 Empirical Evidence: The 'Top-Down' Approach

Despite the emphasis placed on economic exposure in the theoretical literature, there have been relatively few empirical studies of the exchange rate sensitivity of company cash flows. Those studies which have been conducted have generally taken one of two approaches. The first, which may be regarded as a 'top-down' approach, has involved regression analyses of share returns and foreign exchange rates, in order to obtain an *ex post* measurement of economic exposure. As explained in this section, this method of measuring economic exposure is fraught with methodological difficulties and the studies adopting this approach have generally failed to capture the full extent to which companies experience economic exposure. The second approach has involved the use of surveys of financial executives in order to obtain their perceptions of the economic exposure faced by their companies. This approach is explained in section 2.6.

### 2.5.1 The 'top-down' methodology

The approach taken by empirical studies adopting a 'top-down' methodology is based on the premise that economic exposure may be captured empirically by regressing changes in firm value against exchange rate changes. Adler and Dumas (1984) justify this methodology as follows:

*"What the regression coefficient concept of exposure can provide is a single comprehensive measure that summarizes the sensitivity of the whole firm, as of a given future date, to all the various ways in which exchange rate changes can affect it."* (Adler and Dumas, 1984, p 319)

The empirical research based on this methodology, the majority of which has been conducted in the US, is summarised in Table 2.1. Researchers have been puzzled by the findings which generally reflect that very few firms have significant exchange rate exposure coefficients. This appears to contradict both the economic exposure theory

and anecdotal evidence which suggests exchange rates can be a major determinant of corporate performance.

The regression model used in the ‘top-down’ estimations of economic exposure has generally taken the form of a two factor ordinary least squares regression equation, which explicitly controls for market movements, as follows:

$$R_{it} = \alpha_i + \beta_{1i}R_{mt} + \beta_{2i}XR_t + e_{it} \quad (1)$$

Where  $R_{it}$  is the rate of return on the  $i$ th company’s common stock for month  $t$ ,  $XR_t$  is the rate of change in the trade weighted exchange rate,  $R_{mt}$  is the market rate of return,  $\beta_{1i}$   $\beta_{2i}$  and  $\alpha_i$  are regression coefficients and  $e_{it}$  is the error term.

An alternative two-step approach has been used by Bartov & Bodnar (1994) and Donnelly & Sheehy (1996) which regresses abnormal share returns on changes in the exchange rate, as follows:

$$AR_{it} = \alpha_i + \beta_i XR_t + e_{it} \quad (2)$$

Where  $AR_{it}$  represents the rate of return on the  $i$ th company’s stock less the market rate of return.

As shown in Table 2.1, the precise manner in which equations (1) and (2) have been applied has varied considerably according to three factors. Firstly, the nature of the sample studied, i.e. whether firm level or portfolio-level data is examined. Secondly, the specification of the exchange rate, i.e. whether contemporaneous or lagged changes in the exchange rates have been used. And thirdly, the nature of the time period studied, i.e. the estimation of exposure coefficients over a single time period, or the use of multiple time periods.

**Table 2.1: Empirical tests of corporate exchange rate sensitivity**

Researcher/s	Nature of Sample	Nature of Exchange Rate	Time Period/s	Major Findings
Jorion (1990)	287 US Multinationals Firm level data	US \$ trade weighted exchange rate	Single time period: 1971-89 & 3 sub-periods: 1971-75, 1976-80, 1981-87	5% of companies had significant exposure coefficients (at 5% significance level). Only 109 of the companies had a exposure sign of the same direction for each of the 3 sub-periods.
Booth & Rotenberg (1990)	156 exchange-listed Canadian firms reporting foreign transactions or operations. Firm level data	US \$:Canadian \$ exchange rate	Single time period 1979-83	67% of companies had significant exposure coefficients (at 5% significance level). All of these companies had negative coefficients, indicating that a devaluation in the Canadian dollar reduced share returns.
Bodnar & Gentry (1993)	Equally weighted portfolios: 39 US, 19 Canadian, 20 Japanese Industries. Portfolio level data	Relevant trade weighted exchange rate for each country	Single time periods: Canada & US: 1979-88 Japan: 1983-88	28% of US, 21% of Canadian & 25% of Japanese industries studied had significant exposure coefficients (at 10% significance level).
Amihud (1994)	32 US Fortune 50 leading exporters. Portfolio level data.	US \$ trade weighted exchange rate. Contemporaneous & lagged changes in exchange rate.	Single time period: 1982-88	No relationship between portfolio returns and contemporaneous exchange rate changes. Significant relationships between returns and 1 & 3 month lags in exchange rate.



**Table 2.1 (cont.): Empirical tests of corporate exchange rate sensitivity**

Researcher/s	Nature of Sample	Nature of Exchange Rate	Time Period/s	Major Findings
Bartov & Bodnar (1994)	208 US exchange-listed companies reporting significant FX gains/losses in 3 or more of the past 5 years. Portfolio level data	US \$ trade weighted exchange rate. Studied impact of contemporaneous & lagged changes in exchange rate.	Single time period: 1978-89	No relationship between abnormal returns of the portfolio and changes in the contemporaneous exchange rate, but significant exposure coefficient found when lagged exchange rate (by 3 months) used (at 1% significance level).
Choi & Prasad (1995)	409 US multinationals with foreign sales, profits & assets representing >25% of their respective totals. Firm level & portfolio level data.	US \$ trade-weighted exchange rate	Single time period: 1978-89 & 2 sub-periods: 1978-85, 1985-89.	15% of companies had significant exposure coefficients (at 5% significance level). Of these, approximately two thirds gain from a depreciation in the US dollar. Of the industry portfolios, only 2 out of 10 had significant exposure coefficients (at 10% significance level).
Donnelly & Sheehy (1996)	86 UK significant exporters with at least 40% of total sales accounted for by foreign sales. Portfolio level data.	Sterling trade-weighted exchange rate.	Single time period: 1980-92 & 2 sub-periods: 1980-90 (pre ERM membership) and 1990-92 (post ERM membership).	For single time period, a significant exposure coefficient was reported for the portfolio (at 5% significance level, $R^2 = 5.2$ ). No significant relationship between trade-weighted exchange rate and portfolio returns during the period of Britain's membership of ERM.



The remainder of this section is set out as follows. Firstly, the key findings of the studies which have adopted the 'top-down' methodology are explained (sections 2.5.2 & 2.5.3). Secondly, the reasons why these studies have generally failed to capture significant currency exposure coefficients are explored (section 2.5.4). Finally, the results obtained by those researchers who have examined the company-specific determinants of economic exposure are analysed (section 2.5.5).

### 2.5.2 The US studies

Jorion (1990) was the first to conduct a 'top-down' study of foreign currency exposure. He estimated the exposure coefficients of 287 US multinational corporations, by regressing monthly share returns of the individual companies in his sample on the changes in the trade weighted exchange rate, using equation (1). For the period 1971-1989, he found that only 15 of the companies in his sample had significant exposure coefficients ( $\beta_{2i}$ ) at the 5% level. In addition, Jorion calculated the exposure coefficients over three sub-periods and reported the disturbing finding that of the 287 companies, only 109 had an exposure coefficient with the same sign for each of the three sub-periods.

Similar findings were reported by Choi & Prasad (1995), who calculated exposure coefficients for 409 multinational corporations<sup>8</sup> and found only 15% to be significant at the 5% level. When Choi & Prasad calculated the exposure coefficients for two subperiods, they found that the number of firms with significant exchange risk coefficients was higher during the sub-period in which the US dollar was relatively weak (55 companies) than during sub-period during which the US dollar was relatively strong (34 companies). The results obtained by Choi & Prasad and Jorion therefore cast grave doubts over the ability of *ex post* regression-based measurements

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<sup>8</sup> Choi & Prasad define a multinational firm as one with foreign sales, net operating profits and physical assets of 25% or more of their respective corporate totals.

of economic exposure to predict the extent to which a company's performance will be affected by foreign exchange rates in the future.

An alternative to calculating exposure coefficients for firm-level data has been to construct portfolios of companies and examine the extent to which the portfolio returns are related to changes in the exchange rate. Bodnar & Gentry (1993) constructed equally weighted portfolios for 39 US, 19 Canadian and 20 Japanese industries. They found 9 US, 4 Canadian and 5 Japanese industries<sup>9</sup> had significant exposure coefficients (at the 5% significance level or below).

A major shortfall of examining industry level data is that even within industries, the currency exposures of individual firms can vary greatly. Some companies may be net importers and will therefore benefit from an appreciation in the domestic currency, while others may be net exporters, causing their returns to be negatively related to home currency appreciation. As a result, the individual exposures of the companies within the industry portfolio may be largely offsetting, reducing the overall sensitivity of the portfolio returns to foreign exchange rate movements. In order to avoid this problem, Ahimud (1994) examined the effect of changes in the US dollar trade-weighted exchange rate on the returns of a portfolio of 32 exporting companies. However, he failed to find a contemporaneous effect of changes in foreign exchange rates on the returns of the portfolio.

Ahimud also considered the relationship between lagged changes in the exchange rate and the returns on his portfolio of exporting companies. Such a study is based on the premise that investors take some time to fully incorporate the impact of a movement in exchange rates in the market value of a firm. Ahimud found some evidence, albeit weak, of a one and three month lag in the impact of exchange rates on the portfolio returns. More conclusive evidence is reported by Bartov & Bodnar

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<sup>9</sup> US industries with significant exposure coefficients: metal mining, apparel, petroleum refining, transport equipment, motor freight transport, wholesale trade-durable goods, general merchandise stores, misc. retail, business services. Canadian industries: department stores, metal mining, oil & gas, transportation equipment. Japanese industries: construction, chemicals, oil & coal products, electric machinery, precision instruments.

(1994). They examine the exposure coefficients of 208 US exchange-listed companies reporting significant foreign exchange *translation* gains or losses in three or more of the previous five years. Their model consists of a single regression of abnormal stock returns against current and lagged changes in the trade-weighted exchange rate as follows:

$$ASP_{i,t} = a_0 + c_0 \Delta CUR_{i,t} + c_1 \Delta CUR_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

Where  $ASP_{i,t}$  is the abnormal stock performance for security  $i$  in period  $t$ ;  $\Delta CUR_{i,t}$  is the percentage change in the trade-weighted US dollar exchange rate index for the current fiscal quarter;  $\Delta CUR_{i,t-1}$  is the percentage changes in the trade-weighted US dollar exchange rate index for the previous fiscal quarter;  $a_0$ ,  $c_0$ ,  $c_1$  are the parameters to be estimated and  $\varepsilon_{i,t}$  is the error term for firm  $i$  in period  $t$ . Their findings showed that only the change in the value of the dollar in the previous fiscal quarter was significantly related to the abnormal returns in the current quarter (at the 1% significance level). These results therefore support the hypothesis that there is a lagged relationship between movements in foreign exchange rates and firm value.

### 2.5.3 The non-US studies

Two major top-down studies of currency exposure have been conducted outside the US. The first, conducted by Booth & Rotenberg (1990) was a study of the exchange rate exposure of 156 Canadian firms. Using the exchange rate between the US and Canadian dollars as the independent variable, they found that two thirds of their sample had significant coefficients (at the 5% level of significance). A somewhat unusual finding reported by Booth & Rotenberg is that all of the companies had negative regression coefficients, indicating that a depreciation in the Canadian dollar had a negative impact on the sample companies. The researchers explained this result by pointing out that many Canadian firms have a large cost exposure due to their reliance on semi-manufactured goods and components imported from the US.

The other study of non-US companies was conducted by Donnelly & Sheehy (1996). They constructed a portfolio of 39 UK 'significant exporters' which sold at least 40% of their total output in foreign markets and found the abnormal returns of the portfolio were significantly related to changes in the sterling trade-weighted exchange rate (at the 5% level). Donnelly & Sheehy also estimated the exposure coefficients for two sub-periods, representing pre-ERM membership and ERM membership. They found that there was no significant relationship between sterling and the abnormal returns of the portfolio during Britain's membership of the ERM (September 1990-August 1992), suggesting that the currency exposure of UK companies was reduced during this period.

The empirical literature reviewed in this section and the previous one reveals that non-US studies have generally reported greater levels of significant currency exposures than those studies based on US companies. Donnelly and Sheehy (1996) suggest that the differences between their results and those of previous US studies arise because the market perceives large UK exporters as being more exposed to currency risk than their US counterparts. They account for this perception as follows:

*"This may be because the UK exporters either choose, or are forced to, take FX risk when US exporters do not. US companies may find it easier to avoid FX risk because the importance of the dollar internationally makes it easier for them to denominate their sales in terms of their domestic currency. Therefore, only US exporters whose exports are highly price-elastic will be significantly affected by FX rate movements."* (Donnelly and Sheehy, 1996, p 160)

An alternative explanation of the differences in the significance of the currency exposure coefficients is that type of companies which are examined in the US and UK studies are different. The US companies studied by Jorion (1990) and others are large multinational firms. The cash flows of such corporations are likely to be relatively immune to fluctuations in foreign exchange rates. This is because the

international operations of multinational corporations are usually conducted via foreign subsidiaries and it is only dividends or royalty payments which are remitted to the parent company. In contrast, the UK firms contained in the portfolio studied by Donnelly and Sheehy were exporting firms that exported more than 40 per cent of their output to foreign markets *from the UK*. It is to be expected that such companies have a greater level of economic exposure than their multinational counterparts because all of the cash flows arising from their foreign sales must be converted into the company's home currency.

#### **2.5.4 The problems associated with the use of the 'top-down' approach**

A major difficulty with the top-down approach to estimating economic exposure is that it only captures the residual economic exposure, once hedging activities have taken place. Such an analysis will not capture the currency exposure of a company with a highly effective hedging programme, which has reduced the sensitivity of its short-term value to exchange rate fluctuations. This could be a major reason why many of the studies of firm-level failed to find a large number of companies with statistically significant exposure coefficients. This shortfall is recognised by Chow, Lee & Solt (1997), who comment:

*"A possible rationalisation for the absence of empirically significant exchange exposure is that firms hedge exchange-rate risk so well that firm value is invariant to unexpected changes in exchange rates."* (Chow *et al*, 1997, p 107)

As will be explained in the following chapter, it is possible for a company to obtain some degree of shelter from changes in foreign exchange rates in the short-term using financial instruments, for example by entering into forward foreign exchange contracts. It is generally accepted, however, that a company cannot achieve a perpetual hedge of its competitive currency exposure in this way (see Figure 3.2). It is possible that the failure of most of the regression based studies to provide evidence of significant currency exposure among a large number of companies is because the

companies examined are successfully hedging their *short-term* cash flows from foreign exchange rate movements. While some researchers such as Ahimud (1994) have investigated lagged relationships between exchange rate changes and share prices, the lags used are usually only up to three months in length. It may, however, take many months or even years for the protection derived from financial hedging to be exhausted.

This problem is compounded by the focus of the regression analyses on those companies which are most likely to hedge their currency exposure. For example, the studies conducted by Jorion (1990) and Choi and Prasad (1995) considered US multinational corporations. As explained in the previous section, applying the top-down methodology to such companies may not necessarily yield significant currency exposure coefficients because their cash flows are likely to be hedged naturally due to the offsetting nature of their cost and revenue exposures. Furthermore, as argued by Bartov and Bodnar (1994), such firms are likely to be able to hedge potential economic exposure at a relatively low level of cost.

A more serious criticism of the approach taken by the regression-based studies is that they do not take into account whether the foreign exchange rate changes are expected or unexpected. If exchange rate changes are anticipated, one would expect to find insignificant exposure coefficients as investors will have already incorporated the anticipated impact of the exchange rate movement into share prices. In order to avoid this problem, it seems that it would be more appropriate to examine the relationship between exchange rate changes and operating cash flows.



### 2.5.5 The cross-sectional determinants of exchange rate sensitivity

Some of the empirical investigations of the relationship between share returns and foreign exchange rates have explored the extent to which the cross-sectional differences in the exposure coefficients may be explained by differences in firm specific variables. In his analysis of the currency exposure of 287 US multinationals, Jorion (1990) estimated the following cross-sectional regression equation using generalised least squares:

$$R_{it} = \beta_{0i} + (\gamma_0 + \gamma_1 F_i) R_{st} + \beta_{3i} R_{mt} + \eta_{it}$$

Where  $R_{it}$  is the rate of return on the  $i$ th company's common stock for month  $t$ ,  $R_{st}$  is the rate of change in the trade weighted exchange rate,  $R_{mt}$  is the market rate of return and  $F_i$  is the ratio of foreign to total sales. He found a positive relationship to exist between the foreign sales variable and exchange rate exposure (significant at the 5% level).

Booth & Rotenberg included a greater number of explanatory variables than in their investigation of the determinants of economic exposure. In order to explore the relationships between their exposure coefficients of 156 Canadian firms. The regression model adopted by Booth & Rotenberg is specified as follows:

$$\alpha_i = \beta_0 + \beta_1 IND + \beta_2 CND + \beta_3 XLIST + \beta_4 FA + \beta_5 FS + \beta_6 FD$$

Where:

- $\alpha_i$  = exposure coefficient
- IND = dummy variable, 1 = firm is resource based
- CND = dummy variable, 1 = firm selected current-noncurrent method prior to implementing CICA S1650
- XLIST = dummy variable, 1 = firm has shares cross-listed on US exchanges
- FA = proportion of foreign to total assets
- FS = proportion of foreign to total sales
- FD = proportion of foreign to total long term debt

The most significant effects were XLIST and IND, which were both negatively related to the exposure coefficient and significant at the 1% level. Booth & Rotenberg explain that there is a negative relationship between the exchange rate and the XLIST variable because a depreciation in the Canadian dollar reduces the US dollar value of the Canadian holdings of US shareholders and there is a runoff of US shareholder interest. It was anticipated that the IND dummy variable would be positively related to the currency exposure coefficient, as resource based firms are believed to benefit from a depreciation of the Canadian dollar, due to the denomination of their output in US dollars. Booth & Rotenberg explain this counterintuitive result by pointing out that US shareholder interest is focused on resource stocks.

Suprisingly, a significant relationship was not found to exist between the financial variables measuring the proportion of foreign assets, sales and long term debt. Booth & Rotenberg conclude that the major determinants of the exposure coefficients of their sample of companies had not been captured by the independent variables included in their model (an adjusted  $R^2$  of 16.1 was obtained).

The only other 'top-down' examination of the determinants of currency exposure coefficients was conducted by Choi & Prasad (1995). Two characteristics distinguish their analysis from the studies conducted by Jorion and Booth & Rotenberg. Firstly, they examine only those firms which were found to have significant exposure coefficients in the first part of their study. Secondly, the independent variables in their model - foreign assets, sales revenue and operating profits were specified as amounts rather than as ratios. They adopted the following model:

$$\gamma_i = a_0 + a_1 X_{it}; \quad X_{it} = S_{it}^f, A_{it}^f \text{ or } \pi_{it}^f$$

Where  $\gamma_i$  represents the exposure coefficient,  $X_{it}$  is the trade-weighted US dollar exchange rate,  $S_{it}^f$  is the foreign sales revenue,  $A_{it}^f$  is the foreign identifiable assets and  $\pi_{it}^f$  is the foreign operating profit.



The effect of the firm-specific variables was examined on the exposure coefficients for the whole 1985-1989 period and also on the exposure coefficients for each of the five years. Foreign sales and assets were found to be significant determinants during the overall period of 1985-89 (at the 10% level) and also for three of the five individual years. The foreign operating profits variable was not significant for the overall sample period, but was significant for each of the first three years. All three variables were found to have positive coefficients, indicating a positive relationship between foreign operations and currency exposure.

While these studies provide some evidence regarding the direct sources of exposure, the ability of variables such as operating sales, profits and assets do not appear to explain a substantial proportion of the cross-sectional variations in the currency exposure coefficients. There are two factors which may explain why this is so. The first concerns the use of accounting data to measure the foreign operations of companies. The distinction between domestic and foreign operations is often not clear cut in accounting standards because of problems such as transfer pricing. As Jorion (1990) acknowledges, the definition of foreign sales may differ across companies, which may create measurement errors.

A second factor relates to the focus of these studies on only the direct sources of economic exposure. As emphasised by Luehrman (1990), indirect sources of economic exposure, such as the degree of foreign competition faced may double-up or cancel out the currency exposure arising from the direct sources. Moreover, there is often considerable interaction between the determinants of economic exposure. For example, the cash flows of a company with high foreign sales and high foreign purchases may be relatively immune to movements in foreign exchange rates. Evidence for the importance of indirect sources of economic exposure was provided by Booth & Rotenberg, who found that two of the indirect sources included in their model were the most significant determinants of the currency exposure coefficient.

## 2.6 Empirical Evidence: The Survey Approach

An alternative to using market based studies to estimate economic exposure is to survey financial executives in order to obtain their perceptions of the currency exposure faced by their companies. The vast majority of the surveys which have addressed economic currency exposure have focused on the extent to which it is managed by companies. However, whether or not firms *manage* economic exposure is a substantially different question to whether or not they *experience* it. In a series of interviews conducted with the financial executives of 17 UK multinationals, Belk and Glaum (1990) found that while many of their interviewees were aware of the long term cash flow implications of exchange rate movements for their companies, but did not know what to do about them. In a follow-up study, Belk (1992) re-interviewed 15 of the financial executives interviewed in the 1990 research. She found that four of these financial executives had increased their understanding of the economic exposure experienced by their companies.

Edelshain (1995) was the first to attempt to conduct a survey which would reveal the pervasiveness of economic exposure across a large sample of UK companies. He surveyed approximately 600 British Times 1000 corporations, regardless of the extent of their international activities (a response rate of 20% was achieved). In the questionnaire, the respondents were asked to rate on a three-point scale, the extent to which they considered their company to be vulnerable to and advantaged by 10 different sources of economic exposure. The results, shown in Table 2.2, reveal that substantial economic exposure is experienced by the survey respondents. At least half of the respondents reported some level of vulnerability to each one of the ten forms of economic exposure listed in the questionnaire. For some forms of economic exposure, such as *supply margin* and *elasticity of demand*, approximately 70% of the respondents indicated their company was at least moderately vulnerable. A large number of companies also indicated that their company was substantially or moderately advantaged by each of the nine forms of economic exposure listed.

**Table 2.2: The magnitude of economic exposure: Edelshain's survey findings<sup>10</sup>**

Type of Economic Exposure <sup>11</sup>	Vulnerable <sup>12</sup>		Advantaged	
	Substantially Moderately (%)	(%)	Substantially Moderately (%)	(%)
<i>Supply Margin</i>	34	34	23	38
<i>Local Currency Supply</i>	24	45	19	41
<i>Supply Chain</i>	12	47	14	43
<i>Demand Side Margin</i>	37	25	24	36
<i>Elasticity of Demand</i>	34	36	17	44
<i>Demand Chain</i>	11	44	8	44
<i>Competitive Demand</i>	10	45	10	44
<i>Competitive Supply</i>	14	47	11	42
<i>Quasi-Contractual</i>	30	39	n/a	n/a
<i>Long Term Contract</i>	17	45	13	42

An interesting finding reported by Edelshain is that the positive and negative effects of most of the forms of economic exposure were not perceived to be symmetrical by the survey respondents. For example, 34 per cent of respondents indicated their companies were substantially vulnerable to demand side margin exposure compared to 17 per cent who considered their companies to be substantially advantaged. Edelshain concluded that the respondents were preoccupied with the negative effects of currency exposure, which they wished to attribute to external factors.

Alternatively, the preoccupation of Edelshain's survey respondents with the negative impacts of currency exposure may be explained in terms of the 'availability

<sup>10</sup> Adapted from Edelshain (1995) Table 4.2 (p 157) and Table 4.4 (P 161).

<sup>11</sup> The definition of each of the categories of economic exposure is provided in section 2.4.3.

<sup>12</sup> The percentage responses for the third category, 'not vulnerable' are not included in this table, but may be obtained by subtracting the responses obtained for the 'substantially' and 'moderately' vulnerable categories from 100.

heuristic', whereby people judge an event as likely or frequent if instances of it are easy to imagine or recall (Slovic, Fischhoff and Lichtenstein, 1980). The survey was distributed during the period of Britain's membership of the ERM. In the year prior to Britain joining the ERM, sterling appreciated by approximately 10 per cent, on a trade-weighted basis. In terms of the availability heuristic it may be argued that the survey respondents, having recently experienced the effects of a substantial appreciation in the value of sterling, perceived their company to be more exposed to the negative effects of exchange rate movements. Edelshain admits that his questionnaire required the respondents to look back at what has happened in the past as a guide to what is likely to happen in the future:

*"Managers are asked ..... how they have been affected in the past, not how they will be affected in the future. They are looking back at the way exchange rate changes which have already occurred have affected them."* (Edelshain, 1995, p 106)

There are two factors which may limit the generalisability of the survey results obtained by Edelshain. Firstly, the low response rate of 20 per cent he achieved. He admits that his findings may be affected by non-response bias as a result of the poor response rate:

*"The number of corporations admitting to no currency exposure among those providing unusable data is, at 40% of the total, greater than the proportion of those providing usable questionnaires who gave the same response. A bias in response by those admitting to currency exposure and its management cannot, therefore, be dismissed."* (Edelshain, 1995, p 144)

The '40 % of the total' referred to by Edelshain represents the 27 corporate treasurers which replied that they would not be completing the questionnaire because they considered that their companies were unaffected by currency volatility, out of a total of 70 companies which returned uncompleted questionnaires. But this may be an unreliable measurement of the currency exposure of the survey non-respondents. The 70 companies which returned uncompleted questionnaires only represent approximately 20% of the survey non-respondents. Therefore it may not be valid to



assume that the reasons for non-response given by the 70 companies returning uncompleted questionnaires are representative of all non-responding companies. Edelshain did not conduct any other tests of the representativeness of his survey respondents. The extent to which his results are affected by non-response bias is therefore unknown.

A second factor which may limit the extent to which Edelshain's findings can be generalised is that his survey was distributed during the period of time in which sterling was a member of the ERM. As a result, the size of the fluctuations in sterling with respect to the other ERM currencies was reduced, presumably reducing to some extent the magnitude of the economic exposure faced by the responding companies. Evidence of a reduction in the exchange rate sensitivity of UK companies during the period of ERM membership is provided by the regression-based analysis conducted by Donnelly & Sheehy (1995). As explained in section 2.5.3, they failed to find a significant exposure coefficient for a portfolio of significant UK exporters during the period in which sterling was part of the ERM. It is therefore conceivable that Edelshain's survey findings *underestimate* the exchange rate sensitivity of UK companies.

## 2.7 Summary and Conclusions

In the past 25 years, economic exposure has emerged as the most important form of currency exposure, despite the complexity associated with its measurement. The review of the literature conducted in this chapter has revealed two major reasons why we might expect companies operating in today's environment of volatile foreign exchange rates to experience substantial economic exposure. First, the significant changes in real exchange rates which arise as a result of substantial deviations from relative purchasing power parity. Even if PPP were to hold perfectly, individual firms may face significant economic exposure as a result of prices in their own buying and selling markets not moving in line with the general rate of inflation. The second reason is that economic currency exposure may arise from a large number of direct and indirect sources. The theoretical literature which discusses the sources of economic exposure shows that a company may be exposed to foreign exchange rate movements not only due to its own international structure, but also as a result of the reactions of its competitors, suppliers and customers to exchange rate changes.

The empirical relationship between firm value and foreign exchange rates has been the subject of a number of studies conducted in the US. The findings of these studies are puzzling since they show that only a small number of companies have significant currency exposure coefficients. It is likely, however, that these results are caused by limitations associated with the methodology employed rather than a lack of currency exposure among US firms. A number of these studies have also examined the extent to which differences in the exposure coefficients may be explained by firm-specific characteristics. Not surprisingly, the researchers report that currency exposure is increased as a result of a company having foreign sales, profits or assets. But the indirect sources of economic exposure have not been examined, nor have the interactions which exist between the various determinants of currency exposure.

In contrast to the significant body of US research, there are only two studies of which the author is aware, which seek to examine the relationship between firm value and



exchange rates in the UK. These findings of these studies suggest that the cash flows of British companies may be more sensitive to exchange rate movements than those of their US counterparts. There are two areas in which the UK research is deficient. The first is that the results obtained by the researchers may not be generalisable. Donnelly & Sheehy (1996) focused on the exchange rate exposure of large UK exporters. The currency exposure of such companies may be substantially different to that experienced by importing firms, or purely domestic companies. On the other hand, while Edelshain (1995), studied the economic exposure of a wide cross-section of British companies, his survey was distributed during the period of time in which sterling was a member of the ERM. It is likely that UK companies were less vulnerable to movements in exchange rates during this time, due to the stability of exchange rates between sterling and other ERM currencies. The second deficiency in the existing research on the economic exposure of UK firms is that the company-specific determinants of corporate exchange rate sensitivity have not been examined.

The empirical research conducted in this thesis seeks to address these deficiencies by determining the extent to which the cash flows of British firms are sensitive to movements in foreign exchange rates. In addition, the study seeks to discover the company characteristics which determine the magnitude of its economic exposure. In contrast to the US studies which have addressed this second question, this study will examine both the direct and indirect sources of economic exposure.

## **CHAPTER THREE**

### **The Management Of Economic Exposure : A Review Of The Literature**

#### **3.1 Introduction**

In the 1970s and early 1980s, the literature on currency risk management was largely restricted to discussions of the issues associated with the management of transaction and translation exposures. Most researchers addressed only the short term aspects of foreign exchange risk management. Since the late 1980s, however, research has focused on the more complex issues associated with the management of long-term economic exposure. It is now accepted that foreign exchange risk management requires a strategic approach and should be integrated with all areas of corporate decision making. The purpose of this chapter is to review the significant body of research which has focused on this strategic approach to economic exposure management.

##### **3.1.1 Why should firms manage currency exposure?**

Before considering which strategies may be used to manage economic exposure, it is necessary to discuss whether or not it should be managed at the corporate level. According to the capital asset pricing model (CAPM), if currency risk may be considered an unsystematic risk, it can be diversified away by investors in the construction of their portfolios. Therefore, management of such risk at firm level is economically inefficient. In addition, by extending the analysis of Modigliani & Miller (1958), Buckley (1993) argues that investors are able to engage in 'home-



made' hedging, which makes the management of currency exposure at corporate level irrelevant. Despite these arguments, foreign exchange risk may affect the firm in a number of ways which cannot be offset by individual investors altering their own financial positions. Three main reasons have been advanced which justify the management of currency exposure at corporate level. These are: the costs associated with financial distress, the convexity of the tax function, and the existence of capital market imperfections.

By reducing the volatility of cash flows, managing currency exposure reduces the probability of the firm going into financial distress and incurring the costs this entails. As recognised by Levi & Secru (1991) and Buckley (1992), even if the firm falls short of bankruptcy, financial distress involves substantial direct and indirect costs which can destroy firm value, for example higher contracting costs with customers, employees and suppliers. Smith & Stulz (1985) argue that by managing currency exposure a firm can reduce the volatility of its earnings and thereby reduce the probability of financial distress.

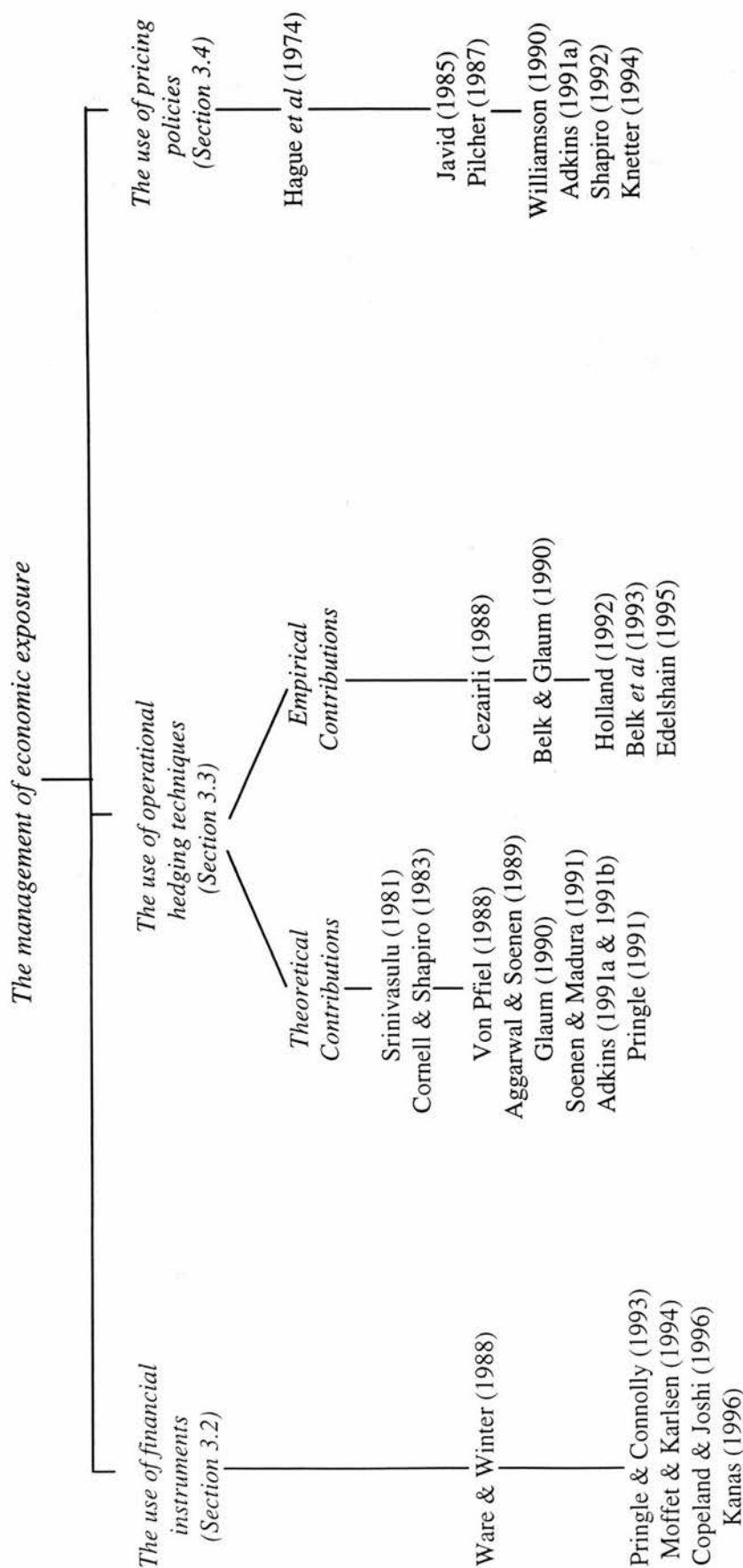
A second cash flow-based justification for managing currency exposure at corporate level relates to taxation. If a firm faces a convex tax function, smoothing income via financial risk management reduces its effective tax rate and therefore the amount of tax it must pay. In addition, Mian (1996) argues that 'tax shields', which enable companies to postpone the payment of taxes, also provide an incentive to reduce cash flow variability. Tax shields are valuable because they provide the firm with the ability to defer tax liabilities further into the future, thereby reducing their present value. Empirical evidence for the taxation-based justification for managing currency exposure is provided by Nance, Smith & Smithson (1993). Using logistic regression, they find that a company is more likely to use financial instruments for hedging purposes if it has more investment tax credits or if more of the range of the firm's income is in the progressive region of the tax schedule. Berkman & Bradbury (1996) also report a positive relationship between the existence of tax-loss carry forwards and the use of derivatives by New Zealand firms.

The third justification for foreign exchange risk management by firms is based on the existence of capital market imperfections. Dufey & Srinivasulu (1984) argue that in contrast to the conditions assumed by Modigliani & Miller (1958), there are barriers which mean that hedging by investors may not be as efficient as corporate hedging. Entry barriers may exist in the form of restricted access to capital markets. In addition, a number of risk management techniques are not available to the individual investor, for example, the leading and lagging of foreign currency payments. Even when such techniques are available to individual investors, they may face larger transaction costs or 'information gaps'.

Froot, Scharfstein & Stein (1994) also present an argument for the relevance of financial risk management which is based on the existence of capital market imperfections. They point out that earnings variability leads to the problem of 'under-investment' because it forces companies to reduce the amount of capital devoted to new projects or seek external financing at times of low profitability. As a result of capital market imperfections, for example the transaction costs associated with obtaining external financing, this form of financing is more costly than using internally generated funds. Therefore, by reducing earnings volatility via financial risk management, companies may avoid the problem of under-investment.

As a result of the arguments discussed above, it can be seen that the management of economic currency exposure at firm level can be justified. Three alternative methods of managing this form of currency exposure have been suggested in the literature. Firstly, the use of financial instruments and in particular, foreign currency options, to hedge future cash flows. Secondly, making adjustments in the operating policies and strategies of the firm (e.g. purchasing, production, marketing), a practice commonly referred to as *operational hedging*. And finally, the use of pricing policies such as invoicing in the domestic currency of the firm and making adjustments in prices following a movement in foreign exchange rates. These methods of managing economic exposure are discussed in the following three sections, as illustrated in Figure 3.1.

Figure 3.1: Major research investigating the techniques for the management of economic currency exposure



## **3.2 Managing Economic Exposure Using Financial Instruments**

The increasing realisation by corporations that economic exposure is the most appropriate measure of a firm's foreign exchange exposure has occurred simultaneously with a significant increase in the variety of financial instruments available to manage such financial risks. It has frequently been debated in the economic exposure as to whether such financial instruments are appropriate for the management of long-term economic exposures.

### **3.2.1 Research supporting the use of financial instruments**

There exists a substantial body of research which investigates how financial instruments may be used to manage transaction and translation exposures. These include the use of forward contracts for hedging future contractual foreign currency receipts or payments (e.g. Khoury & Chan, 1988) and the use of currency options for the management of contingent exposures (e.g. Feiger & Jacquillat, 1979). In contrast, papers which apply the use of financial instruments to economic exposure are few and far between.

The use of financial instruments to offset the impact of exchange rate changes on the value of the firm is referred to by Smithson (1987) as 'LEGO' hedging. He illustrates that currency exposure may be managed by creating complex hedges using the basic building blocks of traditional financial instruments. Moffet and Karlsen (1994) point out that managing economic exposure in this way requires the construction of a hedge such that whenever cash flows are lost by the firm as a result of adverse exchange rate movements, they are offset by an equal but opposite movement in the direction of the hedge position. There have been two main attempts to illustrate how such a hedge of economic exposure may be constructed.

Ware and Winter (1988) show how a portfolio of currency options may be constructed to hedge economic exposure, when the firm has *ex post* production flexibility. This flexibility requires that the firm has the choice of where production should take place and where inputs are sourced. As such, their analysis implicitly applies to multinational firms or those companies which have foreign production facilities, although this is not formally recognised in their paper. They also make the extreme assumption that the risk of exchange rate changes dominates the uncertainty in prices, meaning that prices in foreign currency terms are constant and known. Their analysis therefore ignores the adjustments in foreign currency prices which may take place following exchange rate movements as a result of exchange rate pass-through<sup>13</sup>, or due to the impact of foreign competition.

Like Ware and Winter, Kanas (1996) also illustrates how economic exposure may be hedged using foreign currency options. He focuses on exporting companies and assumes that such companies publish a dual-currency price list in order to fulfil their objective of expanding market share over time. This assumption implies that exporting firms absorb the adverse impacts of foreign exchange rate movements in terms of reduced profit margins in order to protect their market share, while passing-through the favourable impacts to foreign customers in order to expand their market share. As a result of such a strategy, the profile of the economic exposure faced by the firm is concave and Kanas illustrates how this may be hedged using a long call on the currency in which the exporters' sales are denominated.

While the analyses of Ware *et al* and Kanas are based on restrictive assumptions, they show that in some cases it may be possible to hedge currency exposure using financial hedges. There are, however, a number of reasons why financial instruments may not protect the value of the firm from being eroded by exchange rate movements in the long term. These limitations are analysed in the following section.

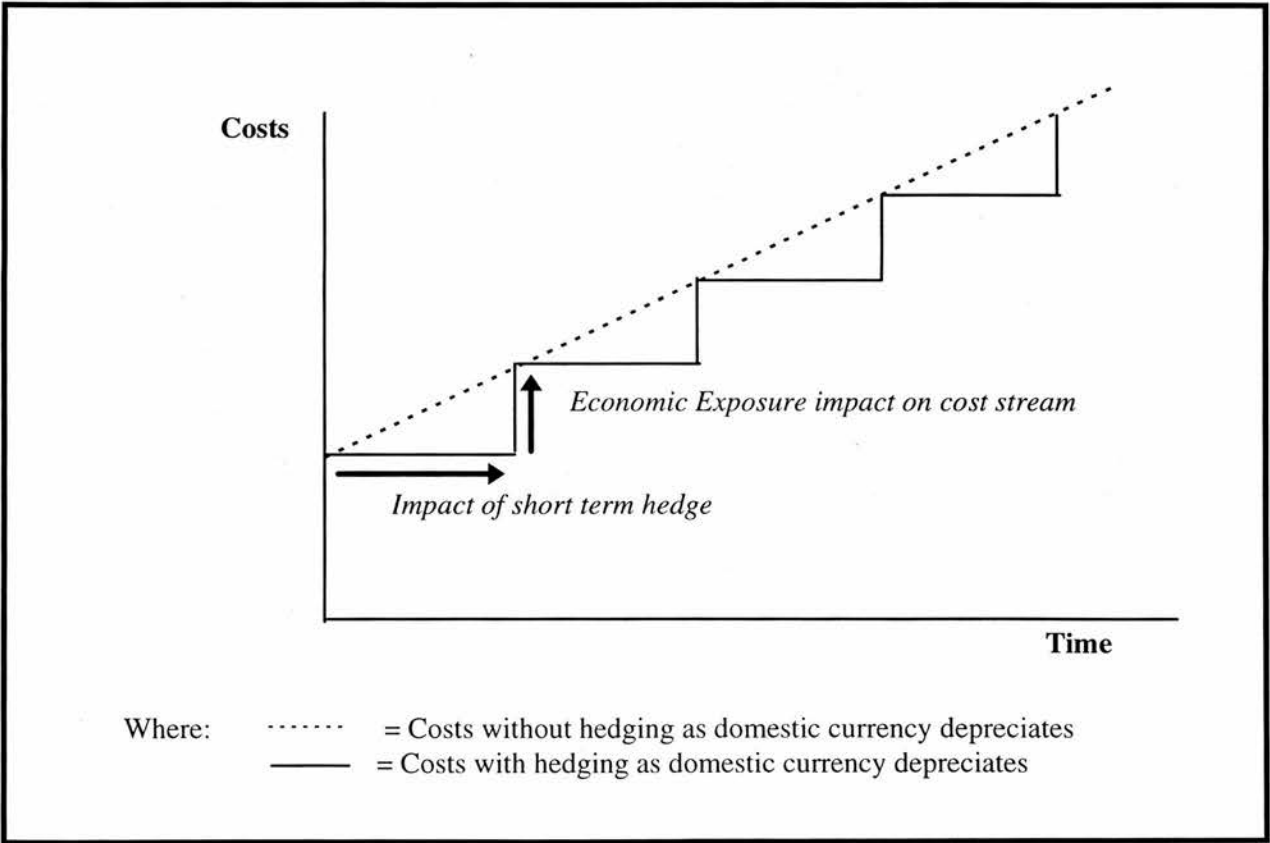
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<sup>13</sup> See section 3.4.2 for a discussion of exchange rate pass-through

3.2.2 Research opposing the use of financial instruments

A major reason for the inadequacy of financial instruments such as forward contracts, is that there is often a mismatch in the maturity of the instrument and the long term time frame over which economic exposure is viewed. A series of short term hedges using forward contracts for example, does not effectively eliminate the long term cash flow effects of economic exposure. Such a series of hedges are referred to as ‘sequential hedges’ (see Soenen & Madura, 1991; Aggarwal & Soenen, 1989). The difficulty associated with sequential hedging is presented graphically in Figure 3.2.

Figure 3.2: The ineffectiveness of financial instruments for the management of economic exposure<sup>14</sup>



<sup>14</sup> Adapted from Pringle, J. & Connolly, R. (1993), p 70.

Figure 3.2 reflects that each hedge only neutralises the exposure for the period of the hedge. As each successive hedge is put in place at a different rate, the long term effects of economic exposure are not neutralised. The sequential hedges merely interrupt the process temporarily, but do not protect the company against sustained departures from relative purchasing power parity in a given direction (Pringle & Connolly, 1993).

A second justification for the inadequacy of financial instruments for protecting the firm from the adverse impact of economic currency exposure is presented by Moffet and Karlsen (1994). They point out that although the firm may be able to replace earnings or profits lost by exchange rate movements by financial hedging, it is not replacing actual market share. While financial hedging replaces the lost cash flows, it does so superficially. This inadequacy of the use of financial instruments for managing economic exposure is summarised by Adkins (1991a) as follows:

*“Forward contracts and their surrogates are the ideal means for managing the conversion effect; but they are less than adequate for hedging the competition effect.”* (Adkins, 1991a, p 23)

A third reason for the ineffectiveness of financial instruments in the management of economic exposure relates to their accounting treatment. If the cash flow involved is non-contractual (as will often be the case with long term cash flows), current accounting rules in the US, under SFAS 52 recognise such contracts as ‘speculative’ as opposed to ‘hedging’. As such, hedge accounting, which involves matching the gains or losses on the financial instrument against the gains or losses in operations, is not permitted. This can have a major effect on the variability of a company’s profitability because variations in the value of the financial instrument have no offsetting effect. With the exception of Duangploy, Bakay and Belk (1994), this drawback of using financial instruments to hedge future economic exposure has received relatively little attention in the risk management literature. While there is no specific standard in Britain which deals with hedge accounting, a recent discussion paper issued by the Accounting Standards Board (1996) proposes that hedge



accounting should not be used where there cash flows are neither contractually nor commercially committed.

The most striking empirical evidence of the ineffectiveness of financial instruments for the management of economic currency exposure comes from a recent empirical study undertaken in the US by Copeland and Joshi (1996). They estimated the potential benefits of foreign exchange hedging for a sample of approximately 200 large US firms. In order to do this, they calculated the volatility of each company's pre-tax income and compared it with the volatility of *hedged* pre-tax income, using data from a 10 year period. They found that fewer than 10 per cent of the companies included in their sample could reduce the volatility of their cash flows by 20 per cent by hedging their foreign currency exposure using financial instruments.

Two problems arose in the methodology adopted by Copeland and Joshi. The first was the estimation of hedged pre-tax income. They used the change in foreign exchange translation adjustment as a proxy for the exchange exposure which a hedging programme could remove. The second difficulty was obtaining a measure of pre-tax income. Copeland and Joshi acknowledged that some companies hedge their foreign currency exposure and therefore in many cases the reported cash flow is actually a hedged cash flow. In order to avoid this problem, they also calculated the adjusted cashflows for each company assuming that it fully hedged all currency exposure. The researchers then made a conservative decision of whether or not the firm engaged in hedging, by selecting the activity (i.e. hedging or not hedging) which conferred the most advantage on the firm.

While the research conducted by Copeland and Joshi is useful illustration of the inadequacy of financial instruments for the management of long term economic exposure, there is a major flaw in the methodology they adopt. It is implicitly assumed that the translation currency exposure of their sample firms is an effective proxy for their cash flow sensitivity to exchange rates. As illustrated by Dufey (1972), however, the translation effects of currency movements on a company may



be opposite in direction to the cash flow effects. In addition, many companies which face the largest degree of currency exposure, i.e. exporters and importers, do not have foreign subsidiaries and therefore have no translation exposure. For such companies, the impact of currency movements on their cash flows can be highly significant. Therefore, even if Copeland and Joshi are correct in assuming that the translation exposure is an accurate proxy for the cash flow exposure of their sample firms, their conclusions may not be extended to all companies and may only be regarded as applying to those firms which have foreign based subsidiaries.

This section has shown that while the increasing sophistication of financial instruments means that they may be useful for the management of economic exposure over the short-term horizon, their effectiveness in protecting the long term profitability of the firm remains limited. Two alternatives to the use of financial instruments for the management of economic exposure are considered in the following two sections. These involve making adjustments in operational and pricing policies in order to insulate the firm from the adverse effects of currency fluctuations.

### **3.3 Operating Policies and the Management of Economic Exposure**

If financial instruments are to be regarded as inadequate for the management of economic exposure, it is necessary to examine how such exposure may be effectively managed. Srinivasulu (1981), Aggarwal and Soenen (1989) and Soenen and Madura (1991) argue that the long term currency exposure of the firm should be managed by making adjustments in its operating policies and strategies. Such use of production, financial and marketing policies for the management of economic exposure has been referred to as 'natural hedging' (Moffett & Karlsen, 1994) and 'operational hedging' (The Economist Intelligence Unit, 1993). These terms will be used interchangeably in this thesis.

Some of the operational tools which are commonly proposed for the management of economic exposure are as follows:

- The location of a company's production facilities.
- The markets in which the company purchases its inputs.
- The nature of the products sold by the company.
- The markets in which the company sells its products.
- Strategic financial decisions such as the currency denomination of debt.

The literature exploring the use of the above operational hedging techniques may be broadly classified into four categories. Section 3.3.1 analyses the literature which discusses the role of the operating departments of the firm in the management of currency exposure. Section 3.3.2 outlines the large number of operational hedging techniques which have been proposed in the theoretical literature. Section 3.3.3 explains the empirical research which has examined the extent to which companies use these techniques in practice. Finally, section 3.3.4 analyses the factors which may limit the ability of a company to manage its currency exposure using operational policies and strategies.

### 3.3.1 Operating departments and the management of economic exposure

The extent to which the operating departments of the firm (e.g. purchasing, production and marketing) should be involved in the management of currency exposure has been the subject of considerable debate in the international financial management literature. In early discussions, currency risk management was regarded as being exclusively the responsibility of a company's treasury department. Even as late as 1984, Baker and Aggarwal referred to foreign exchange risk management as "*an aspect of tactical, or day-to-day planning*" (p 25). In contrast, others have emphasised that currency risk cannot be managed by the financial executives of a company in isolation from the operating departments, and that an integrated approach to financial risk management is necessary. Dufey (1972) was one of the first to recognise that foreign exchange risk management should be "*integrated with all facets of decision making by the corporation*" (p 56).

Subsequent to Dufey's initial contribution, a variety of views have been expressed regarding the extent that the operating departments such as marketing and production should be responsible for the management of foreign exchange risk. An extreme view was expressed by Cornell and Shapiro (1983), who stated that the responsibility of the treasury department lay only in dealing with residual exposures. In their opinion:

*"the major burden of exchange risk management must fall on the shoulders of the marketing and production executives"* (Cornell & Shapiro, 1983, p 54).

Similarly, Ohmae (1990) maintains that foreign currency exposure is a key consideration to be made in the formulation of corporate strategy:

*"When a sudden fluctuation in trade policy or exchange rates can turn an otherwise brilliant strategy into a seemingly irreparable haemorrhage of cash, making arrangements to deal with such fluctuations must lie at the very heart of strategy, not be an afterthought to a strategy defined by other considerations."* (Ohmae, 1990, p 2)

Such extreme views are not held by the majority of the commentators in this field. Rather, most advocate that the marketing and production departments in a company should merely co-operate with the treasury department in the management of foreign exchange risk. It follows that the operating departments need to be made aware of the implications of their policies for the foreign exchange exposure faced by the firm. For example, von Pfiel (1988) maintains that companies need to remove what he refers to as the 'chinese wall' which separates their business management from the management of their currency exposure.

It has also been emphasised that a proactive approach to economic exposure management is needed and that foreign exchange risk management cannot be a matter of day-to-day planning, on a reactive basis. Glaum (1990) argues that instead of always reacting to exchange rate movements on an ad-hoc basis, the company needs to plan ahead for unexpected exchange rate changes in the same way as it does for other strategic change. Furthermore, von Pfiel (1988) suggests that if exchange risk is viewed as a residual issue, which is managed reactively by using short term hedging techniques, the company will clearly be focused on short term exchange rate movements, rather than the long-term economic exposure it faces. It has also been emphasised that such a proactive approach to currency risk management can only occur if there is a continual flow of information between the treasury department and operating divisions of the firm (see for example Broder, 1984).

There exists little empirical evidence regarding the extent to which the operating departments of companies are involved in foreign exchange risk management. Broder (1984) examined the relationship between the treasury and operating departments of the top 250 Times 1000 UK multinational corporations. Less than a quarter of the respondents to his survey replied that the operating divisions of their companies made their own decisions independently of considerations of currency exposure. A surprising 17 per cent of the respondents stated that the finance department exercised a right of veto over any proposed venture which caused unacceptable foreign exchange risk, while a further 23 per cent stated that operating

policies were decided jointly so that operations were compatible with the overall currency exposure management strategy of the firm.

In contrast to Broder's findings, Belk & Glaum (1990) reported that only three of the 17 financial executives of UK multinational corporations they interviewed said that foreign exchange rate considerations played any role at all in decision making areas such as sourcing and plant location. Further research is clearly necessary in order to establish the extent to which operating divisions are involved in the management of foreign exchange exposure.

### **3.3.2 Operational hedging techniques**

A number of operational hedging techniques have been prescribed for the management of economic currency exposure in the theoretical literature. These may be broadly categorised into four groups: diversification, matching, capability and flexibility policies.

#### **a) Diversification policies**

A policy of diversification is, in many respects, the most straightforward operational hedging technique. It involves the company diversifying its sales in many different currencies as a proactive strategy for managing foreign exchange exposure. As recognised by Adkins (1991a), such a strategy is based on the premise that unfavourable movements in one currency are to some extent compensated by favourable movements in another. Similarly, Soenen & Madura (1991) suggest that by selecting a portfolio of businesses with offsetting exposures, a company may limit its exposure to long-term exchange rate changes. The ability of diversification policy to protect the value of the firm from adverse currency movements may be limited, however, as it ignores the possibility that the company's home currency may appreciate or depreciate against many currencies.



A related technique is described by Soenen and Madura (1991) who suggest that the adverse effects of currency fluctuations can be minimised by differentiating the company's product from those of its major competitors, so that its sales are less sensitive to exchange rate changes.

*"Differentiation essentially involves the avoidance of direct price competition with foreign suppliers by shifting the emphasis of competitive strategy towards non price factors while still competing across the market."* (Soenen & Madura, 1991, p 123)

The shortfall of such a policy is that it may mean the company is less able to exploit favourable long term exchange rate movements. Adkins (1991a) suggests that companies may apply the diversification principle by constructing a portfolio of products, with differing price elasticities of demand. Such an approach would enable the company to concentrate marketing resources on the price-insensitive end of its product portfolio under conditions of unfavourable exchange rates. On the other hand, when exchange rate changes improve the competitive position of the firm, this may be fully exploited by concentrating marketing effort on the undifferentiated end of the company's product range.

#### **b) Matching policies**

Economic exposure arises most frequently in situations where a company has an imbalance between revenue and cost streams in a particular currency. This is referred to by Pringle (1991) as the problem that *"revenue and cost currency footprints do not match"*. A number of researchers (for example Soenen and Madura, 1991) have emphasised the role of matching cost and revenue cash flows in particular currencies as a means of insulating the firm from the adverse effects of exchange rate movements. A company may match its inflows and outflows in two main ways. The first involves the company purchasing its inputs in currencies in which the company makes its sales. This may be achieved by making changes in the company's sourcing policies, or, as in the case of many Japanese firms, by locating production facilities in those countries where it has significant sales levels.

The matching principle may also be applied to a company's financing policy. Aggarwal and Soenen (1989) suggest that a company may employ foreign currency denominated debt so that the debt servicing cash outflows offset the sales revenue cash inflows in a particular currency. The availability of currency swaps makes this policy one of the most flexible methods of natural hedging.

### **c) Capability policies**

Adkins (1991b) suggests that a firm may use the improved profit margins resulting from a depreciation in its domestic currency to create defences for the periods of appreciation. He refers to this process as 'applying capability'. He identifies three strategies which may be adopted by a company during periods in which exchange rates are favourable in order to prepare for the possibility of unfavourable exchange rate movements. These are: investing in operating efficiency; enhancing the competitiveness of the products produced by the company; and building a 'cash mountain' to ensure the company has sufficient funds when exchange rate movements are unfavourable. The shortfall of Adkins' analysis is that it largely ignores those firms which already possess substantial competitive advantage.

Demirag and Goddard (1994) suggest that a firm may combat the adverse impacts of a strong domestic currency by attempting to cut costs through productivity improvements. This may allow companies to maintain constant profit margins without passing through the exchange rate impacts to customers and as such, it is particularly applicable to those firms producing price-sensitive products. Productivity improvements have frequently been used by Japanese companies as a means of managing foreign exchange exposure. *The Economist* (4 March 1989) reports that Japanese companies in a number of industries such as machinery, transport equipment and precision instruments regarded the strengthening Yen in the late 1980s as a signal that their costs needed to fall. Williamson (1990) argues that this is an important factor contributing to the success of Japanese exporters in the United States.

#### **d) Flexibility policies**

The use of real options<sup>15</sup> to manage the long term impact of currency exposure is emphasised by Srinivasulu (1981), Buckley (1988) and Shapiro (1992). This strategy involves shifting production between plants located in different countries, or moving to alternative sources of inputs in response to movements in foreign exchange rates. The use of flexibility is generally regarded as a defensive risk management policy, but Soenen and Madura (1991) suggest that it may also be used to exploit exchange rate movements, by moving production and/or sourcing to countries that become low cost producers as a result of exchange rate movements.

The limitation of the production shifting strategy is that it presupposes that the company has already created a 'portfolio' of plants world-wide (Shapiro, 1992). As such, this is clearly more applicable to multinational corporations than to domestic-based exporting firms. Moreover, some companies may not be able to apply the concept of flexibility to the location of their operations, due to the need to be situated in close proximity to their customers, for example firms in the service industry. There are also factors which may prevent the adoption of a flexible sourcing policy. Producers in a number of industries, for example coffee manufacturers and wine importers, use inputs which are concentrated in a few countries. Such firms may not be able to respond to foreign exchange rate changes by altering the countries in which they source their inputs.

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<sup>15</sup> Kanas (1996) defines a real option as any project or business which embodies alternative operational routes of action which can be utilised when the firm desires.



### 3.3.3 Empirical evidence of the use of operational hedging techniques

The extent to which companies employ financial instruments for the management of currency exposure is well documented (see for example Jesswein, Kwok & Folks, 1995; Grant & Marshall, 1997). In contrast, there exists relatively little evidence regarding the extent to which operational hedging techniques are used by companies in practice. The few surveys of corporate practice which have been undertaken in this field are summarised in Table 3.1.

**Table 3.1: Empirical research regarding the use of operating hedges**

Researcher/s	Methodology	Major Findings
Cezairli (1988)	Postal Survey: US Fortune 500 Companies	60% of respondents used foreign currency denominated debt, 68% used flexibility in sourcing, 52% used geographical diversification, 57% used product diversification, 62% matched costs and revenues in foreign currencies, to manage their currency exposures.
Belk & Glaum (1990)	Interviews: 17 UK MNCs	None of the executives interviewed reported the use of operational hedging techniques.
Holland (1992)	Case Study Analysis: 14 'internationally involved' UK Companies	Uncertain/long term foreign currency exposures were often initially managed via adjustments to corporate strategies and operating policies.
Belk, Bakay & Duangploy (1993)	Interviews: 20 US and 20 UK MNCs	12 UK and 11 US companies reported the use of operating hedges, no details were given.
Edelshain (1995)	Postal Survey: UK Times 1000 Companies	60% of respondents used foreign currency denominated debt, 61% matched costs and revenues in foreign currencies, 12% used strategy of selective overseas plant location, 4% indicated they moved away from input sources with strong/strengthening currencies, 4% said they moved away from sales markets with weak/weakening currencies.

In his postal survey of US Fortune 500 companies, Cezairli (1988) found evidence of widespread use of operational hedging techniques. More than two-thirds of the survey respondents reported using a flexible sourcing strategy, while 60 per cent indicated that their companies employ foreign currency denominated debt. A similar proportion of the respondents stated that their company had adopted the policy of matching cash flows denominated in similar foreign currencies.

In a similar survey of UK Times Top 1000 firms, Edelshain (1995) also reported that a large number of respondents used foreign currency denominated debt and matched cost and revenue foreign currency cash flows (60% and 61% of respondents respectively). Edelshain found that the use of the strategy of altering the currencies in which inputs were sourced was not widespread among UK companies. Only four per cent of the respondents stated that their company moved away from input sources with strong or strengthening currencies. Similarly small proportions of the respondents to Edelshain's survey reported using a number of other operational hedging techniques. He explains this finding as follows:

*"If involvement in the management of currency exposure is dominated by and remains largely within the finance function, use of strategic methods to manage currency exposure, like that of operational techniques, may be and may remain restricted."* (Edelshain, 1995, p 196)

It is doubtful whether the findings of the surveys conducted by Edelshain and Cezairli may be validly compared. The operational hedging techniques listed in Edelshain's survey are generally more specific than those investigated by Cezairli. Edelshain was also careful to specify in his questionnaire that the techniques had to be used *primarily* for the management of currency exposure. Moreover, Cezairli only surveyed multinational corporations while Edelshain included all UK Times 1000 companies in his survey population, regardless of the degree of their international involvement. Multinational corporations are likely to have a higher degree of operating flexibility than their domestic based counterparts and are

therefore able to employ a wider range of operating hedges. This factor may explain the widespread use of such techniques by the multinationals surveyed by Cezairli.

Through his analysis of the case study data of 14 'internationally involved' UK companies, Holland (1992) demonstrates that many of these firms are able to modify their strategy and operating policies in order to manage their foreign currency exposure. These modifications were seen by the financial executives of the sample companies as being particularly useful for the management of uncertain, long term future foreign currency cash flows. Some examples presented by Holland include the use of foreign currency denominated debt and the diversification of production and sales across many different currency zones.

Further empirical evidence regarding the use of operational hedging techniques is provided by the interviews with financial executives conducted by Belk & Glaum (1990) and Belk *et al* (1993). In their study of 17 UK multinationals, Belk & Glaum found that all of the treasury personnel they interviewed reported using only financial means of managing the currency exposure of their companies. Furthermore, most of the interviewees did not see foreign exchange rates and foreign exchange risk as strategic factors. Some emphasised that their companies were committed to their particular business and this did not allow them any flexibility in matters such as sourcing and the location of production facilities.

In a later comparative study of UK and US multinationals, Belk *et al* (1993) interviewed the senior financial managers of 20 companies in each country. Twelve of the UK companies and 11 of the US companies they studied used natural hedging techniques. The precise nature of these techniques is not detailed in their report, however. Belk *et al* concluded that the propensity of UK companies to adopt operational means of managing currency exposure had increased. If this is the case, there is a need for an up-to-date survey of the use of operational hedging techniques by British companies. Given the substantial movements in the value of sterling which have occurred subsequent to the withdrawal of sterling from the ERM in 1992,

it seems reasonable to speculate that the extent to which companies employ operating policies and strategies for the management of currency exposure has increased further.

### **3.3.4 Factors which limit the use of operational hedging techniques**

There are a number of factors which limit the extent to which operating policies and strategies may be successfully used to manage a company's economic currency exposure. The first is that making structural changes to a company's sourcing, production and marketing policies may be costly. In order to alter the currencies in which it sources its inputs, a company may forgo discounts, or harm good relationships with existing suppliers. The adoption of a flexible production strategy not only necessitates a number of production plants, but also may reduce any economies of scale from which the firm benefits. Dolde (1993) argues that there are both direct and indirect costs associated with the use of operational hedging techniques:

*"The feasibility of complete operational hedging, however, is limited by scale economies in production and distribution and by transactions costs of adjusting production, employment and other activities."* (Dolde, 1993, p 5)

The use of strategic financial policies to manage currency exposure may also be costly. Beidleman, Hilley & Greenleaf (1983) point out that there are potentially large transaction costs associated with the use of foreign currency denominated debt. Furthermore, they recognise that some firms may be unable to borrow funds in foreign markets to manage currency exposure because of restrictive debt covenants. To a certain extent, however, these obstacles may be avoided through the use of currency swaps, which were not widely used at the time Beidleman *et al* published their paper.



Another factor which limits the use of operating policies for the management of currency exposure is that they may take a substantial amount of time to implement. Dolde (1993) points out that responding to foreign exchange rate changes by switching suppliers may take up to six months, leaving the firm exposed to currency risk in the meantime. The third and final factor which may prevent the effective use of operational hedging techniques is that currency exposure may be only one of a multitude of strategic factors which must be considered by the firm. This drawback has been recognised by Dufey (1982), who comments:

*“Typically products, production processes, marketing and procurement policies are all established on the basis of fundamental profitability considerations that compel the firm to make various commitments which may be of a contractual or strategic nature. The result is a ‘lock in’ effect, that often imposes very heavy penalties on the firm if prices or business strategy are to be changed quickly. Thus, only in extremis will a company resort to shifts in operating policies to deal with exchange risk.”*

Empirical evidence of this ‘lock in’ effect is provided by Scott (1987), in a case study of Jaguar. He explains that the British craftsmanship of Jaguar cars is one of the main selling points. This means that Jaguar is limited in its ability to relocate its production facilities in the US, in order to match US dollar denominated revenues with US dollar denominated costs. Furthermore, Holland (1992) reports that Jaguar is not able to source its components from outside the UK in those currencies which it receives for its sales. This is due to a group policy that production components are sourced near to factories in order to allow for small inventory levels and closer controls over quality. The increasing emphasis by companies on ‘just-in-time’ inventory systems may mean that they are limited in their ability to employ flexible sourcing strategies for the management of currency exposure.

In contrast to the case of Jaguar, other corporate case studies reflect that currency risk is seen as an important consideration to be made in corporate planning, rather than an

environmental factor to be reacted to on an ad hoc basis. For example, in his case study of Eastman Kodak, Fiedler (1992) comments<sup>16</sup>:

*“...strategic exchange risk is an integral part of a business and inseparable from other strategic business issues. For example, decisions to change where raw materials are sourced, where to manufacture, markets to serve, etc, all will change the nature of the risk embedded in the business”* (Fiedler, 1992, p 23).

The literature reviewed in this section has shown that operational hedging techniques can be an effective alternative to the use of financial instruments for the management of foreign exchange exposure. It is clear, however, that there are a number of factors which limit the effective use of such techniques. This may go some way towards explaining why many companies continue to manage their currency exposure using only financial means.

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<sup>16</sup> For other examples see Srinivasulu (1981), Brown (1995) and Whitaker (1994)

### **3.4 Pricing Policies and the Management of Economic Exposure**

While the corporate pricing policies have received a great deal of attention in the managerial economics literature (e.g. Piercy, 1981), their association with currency risk management has been largely ignored. The small body of research which has investigated the use of pricing policies in the management of currency exposure has focused on two main themes. The first is the choice of the currency of invoice, i.e. whether to invoice in the domestic currency of the company or foreign currency (the domestic currency of the customer). The second theme relates to the use of pricing adjustments following a significant movement in exchange rates.

#### **3.4.1 The currency of invoice**

At first glance, it may appear that a company can insulate its cash flows from currency exposure by avoiding transactions which are denominated in foreign currencies. Such a strategy is suggested by Pedley-Smith (1996), who maintains that by invoicing and requesting payment in sterling a company may reduce its foreign exchange rate risk. The most significant shortfall of such a strategy is that while it removes the exchange rate risk from the selling company, it transfers the risk onto the foreign buyer. The foreign exchange risk is simply repackaged into what has been referred to as 'demand risk' (Piercy 1983). The consequence of such demand risk is that a firm may face a decrease in export sales volumes when there is an increase in the foreign currency equivalent of the prices it charges for its products.

A further disadvantage of pricing in the home currency of the company is that it may reduce the exporter's bargaining power in negotiations relating to price and credit terms (Javaid, 1985). Moreover, Buckley (1992) points out that pricing in a company's home currency fails to take account of the fact that the currency in which goods are invoiced is an essential aspect of the overall marketing package offered to the customer.



Despite the considerable disadvantages associated with invoicing foreign customers in the home currency of the firm, there is widespread evidence in the literature that a significant proportion of British exporters adopt such a strategy. In an early study, Hague, Oakeshott and Strain (1974) interviewed executives in 19 British companies following a substantial devaluation in sterling in the late 1960s. The majority of the companies they interviewed responded that they quoted export prices in sterling. However Hague *et al* noted that there was some evidence of a change in attitude as a result of the sterling devaluation:

*“Some of our firms felt that their bargaining position had been weakened by doing so [invoicing in sterling] and were trying to quote foreign currency prices instead.”* (Hague *et al*, 1974, p 178)

Similar findings were reported by Wood & Carse (1975), who found that 81 per cent (by value) of British exports were invoiced in sterling. They found that those companies producing products with some degree of product differentiation were most likely to invoice their exports in sterling.

A series of surveys conducted by the Department of Trade and Industry (DTI) in the late 1970s confirmed the propensity of UK exporters to invoice their foreign sales in sterling<sup>17</sup>. The DTI examined a random sample of approximately 3,000 export invoices for seven separate months during the period 1976 -1979. The invoices represent approximately one per cent of the total value of UK exports per month at that time. These results, which are summarised in Table 3.2, clearly show that only a minority of UK exports were invoiced in foreign currency in the late 1970s. For the seven months examined, the proportion of exports invoiced in foreign currency ranged from 20 to 31 per cent. The DTI surveys also reflect that large exporters generally have a greater propensity to invoice in foreign currency. This may be due to the greater ability of such companies to manage their currency exposure using financial instruments or operational hedging techniques.

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<sup>17</sup> See Department of Trade and Industry (1978a - 1980b)

**Table 3.2: UK exports invoiced in foreign currency 1976 - 1979**

(Source: Department of Trade and Industry)

Survey Procedure	% of exports invoiced in foreign currency	% of large <sup>18</sup> and small exporters invoicing in foreign currency	Reference
2,700 invoices from April 1976	20%	-	DTI (1977a)
5,400 invoices from Oct/Nov 1976	27%	-	DTI (1977b)
3,300 invoices from May 1977	30%	40% large exporters 27% small exporters	DTI (1978a)
3,600 invoices from Nov 1977	31%	50% large exporters 24% small exporters	DTI (1978b)
3,400 invoices from April 1978	29%	39% large exporters 26% small exporters	DTI (1979)
3,100 invoices from Oct 1978	25%	36% large exporters 21% small exporters	DTI (1980a)
3,200 invoices from May 1979	24%	24% large exporters 24% small exporters	DTI (1980b)

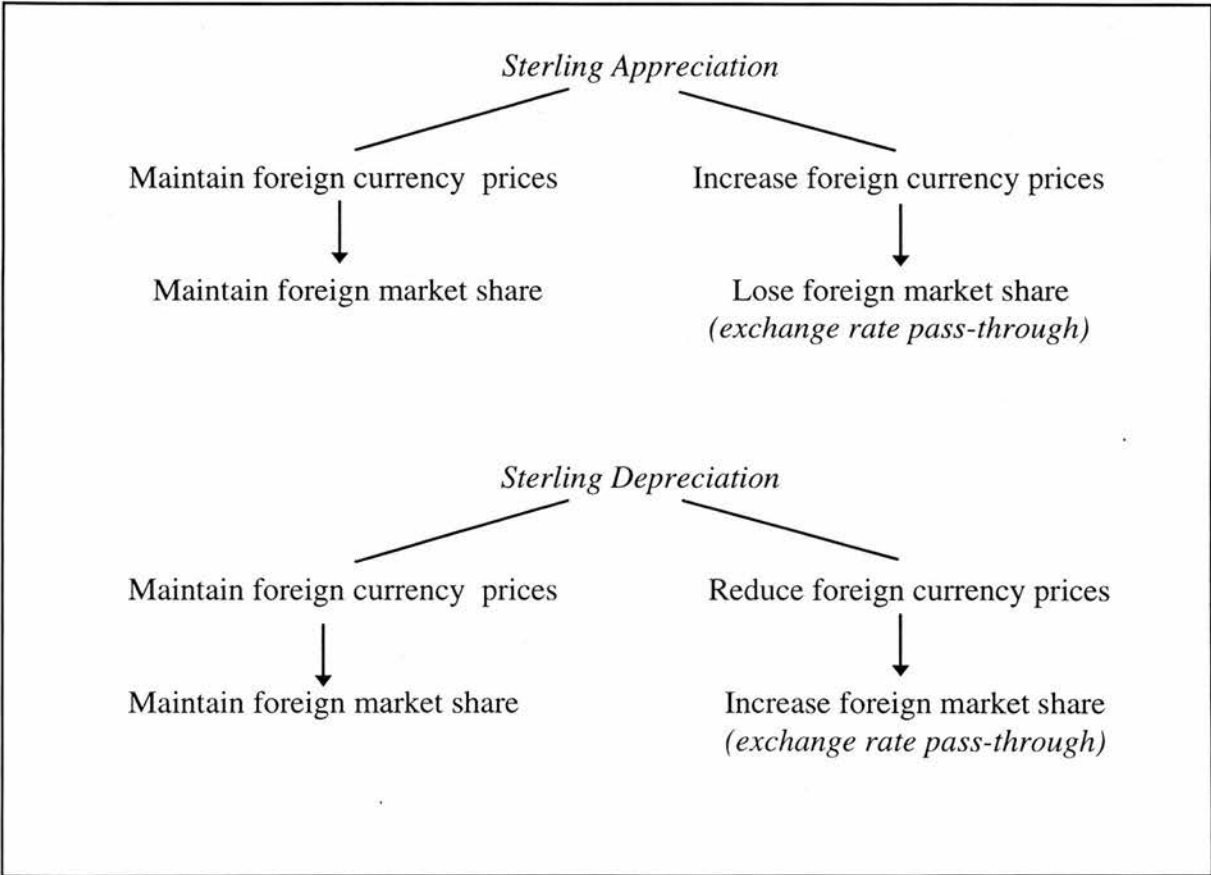
A more recent survey by Javaid (1985) of 92 UK exporting companies awarded the Queen's Award for Export Achievement, found that 50% of the respondents denominated their exports exclusively in sterling. In addition, a further 35% preferred to use sterling whenever possible, but often invoiced customers in foreign currency. Javaid found that such a risk-shifting policy was most associated with those companies who operated in an established export market and who believed that they had a strong market position or exported products with some degree of product differentiation. Similar evidence is presented by Pilcher (1987) who estimates that in 1987, only 25 per cent of British exporters invoiced foreign sales in the currency of their customers, compared to almost 60 per cent of Japanese exporters.

<sup>18</sup> Defined in the survey as one whose exports exceeded £25m in 1975.

### 3.4.2 Exchange rate movements and pricing adjustments

Following an appreciation in the domestic exchange rate, a company is faced with a trade-off between sales volumes and profit margins: It can raise foreign prices and lose sales volume or alternatively, suffer an erosion of its profit margins. A company following a depreciation in its domestic currency faces a similar dilemma. Such a firm is faced with a choice between increasing short term profit by maintaining the price of their product in foreign currency terms - *price skimming*, or increasing market share by reducing the price of their product in foreign currency terms - *penetration pricing*. These trade-offs are illustrated in Figure 3.3.

**Figure 3.3: Foreign exchange rate movements and export pricing**



Even those companies with purely domestic operations may make an implicit decision with respect to pricing adjustments following a movement in foreign exchange rates. For example, following an appreciation in their domestic currency, those companies which operate in import-competing sectors must decide whether they should raise their selling prices in line with the price increases of importing companies, or holding their prices constant in order to improve their market share (Shapiro, 1992).

In theory, it may be possible for a company to immunise its revenue cash flows from the effects of exchange rate changes by making appropriate adjustments in the prices it charges to foreign customers. For example, following an appreciation in its home currency, a company may increase its foreign currency selling prices in order to protect its profit margins. Such a response is only likely to be appropriate for those companies which produce products with highly price insensitive demand. Adkins (1991a) argues that relying on such pricing adjustments is not an effective strategy for the management of currency exposure. He points out that making such price changes assumes that the company knows with certainty the price sensitivity of demand of the company's customers.

*"Local pricing can .... only be perceived as an instrument for achieving a desired competitive position, not as a tool for hedging changing exchange rates". (Adkins, 1991a, p 17)*

Furthermore, by adjusting prices without analysing the actions of competitors, the company may lose market share if its competitors do not act in a similar way. Oxelheim & Wihlborg (1989b) suggest that some firms may not be able to use pricing strategy as a response to exchange rate movements because they have little market power and are therefore forced to follow the prices set by the more dominant producers in the market.

As shown in Figure 3.3, by adjusting prices in order to maintain constant profit margins, a company is implicitly adopting an exchange rate 'pass-through' strategy.

This concept is defined by Knetter (1994) as the elasticity of the local currency price of a foreign-produced good with respect to a change in the exchange rate between the local currency and the currency of the importer. In other words, there is a full 'pass-through' of exchange rate changes to imported goods when the local currency prices of products move in proportion to foreign exchange rate movements. There exists little empirical research regarding the extent to which companies attempt to pass-on the effects of exchange rate changes to their customers.

Hague, Oakeshott and Strain (1974) studied the pricing decisions of 19 British companies following the 14% devaluation of Sterling in 1967. They found that the proportions of the companies holding their foreign currency prices constant and reducing them were relatively similar. They noted that the firms which left their foreign currency prices unchanged after the devaluation were those firms which were already well established in export markets. As a result, they wished to obtain larger sterling profits from their existing sales volumes, rather than use the devaluation as a means of increasing their market share.

In a more recent study, Williamson (1990) examined the relative prices, price volatility and share of total imports in the US of Japanese, British and German companies. He found that the Japanese exporters maintained low and stable prices relative to the UK and German exporters. He attributed this to the fact that in 1986, 82% of exports from Japan to the US were priced in US dollars.

*"This creates a natural tendency for exchange rate fluctuations to be absorbed. Passing on the impact requires active price adjustment..... it appears that many Japanese exporters regard a rising Yen as a signal that their costs must fall, rather than that foreign currency prices must rise." (Williamson, 1990, p221)*

In contrast, he commented that the UK data, which reflected volatile import prices, implied a 'full pass-through' strategy. This finding is consistent with the tendency of British exporters to price in sterling. By invoicing in its home currency, a British exporter does not need to make an adjustment in prices in order to pass-through the

effects of a movement in foreign exchange rate movements to its customers (Knetter, 1994).

The only other empirical evidence regarding the pricing responses of companies to foreign exchange rate movements can be found in those studies which have investigated exchange rate pass-through at the macroeconomic level. With the exception of Cowling and Sugden (1989), who investigate exchange rate pass-through in the UK car industry, the majority of this research has been conducted in the US. Broadly speaking, the researchers have found that exchange rate pass-through is generally incomplete and there are substantial time lags in the transmission of exchange rate changes to prices (see for example Feinberg, 1989; Menon, 1995).

It has also been reported that the extent to which foreign exchange rate changes are passed on to customers in the form of price changes depends on the extent to which companies believe the exchange rate change to be permanent. Froot and Klemperer (1989) investigated the extent to which foreign firms passed through exchange rate changes to import prices in the US. They found that foreign firms priced more aggressively in an attempt to gain increased market share when an appreciation in the value of the dollar was expected to be relatively permanent. In contrast, when an appreciation in the dollar was thought to be temporary, the foreign firms were more likely to leave their US dollar prices constant, increasing their profit margins in home currency terms.

Overall, the discussion presented in this section has shown that the use of pricing policies for the management of currency exposure is highly complex. By invoicing foreign sales in its home currency or by adjusting prices to maintain constant profit margins, a company may not necessarily immunise its long-term cash flows from the effects of foreign exchange rate movements. Indeed, a foreign exchange risk management strategy based on the adjustment of export prices is myopic because it ignores the impact that exchange rate-induced price changes may have on the demand for the company's products.



### 3.5 Summary and Conclusions

This chapter has shown that the traditional financial risk management techniques may not be appropriate for the management of long-term economic currency exposure. While financial instruments are attractive due to the relative flexibility they offer, their ability to protect the competitive position of the firm following an adverse movement in foreign exchange rates remains limited. It is now widely accepted in the literature that companies can most effectively manage economic currency exposure by making adjustments in their operating policies and strategies.

However, a number of surveys of corporate practice conducted both in the US and the UK suggest that operational means of managing foreign exchange exposure are not widely used. It is possible that this is due to a lack of co-operation between financial and operating departments. Alternatively, it may be caused by the significant direct and indirect costs of employing operating hedges, which outweigh the benefits for many companies. It is likely that the theory prescribing the use of operational hedging techniques is too simplistic, and assumes an ideal world where firms can shift production and sourcing at will. In reality, operating decisions are the result of many strategic factors, of which currency exposure is only one. Only where exchange rates are a critical determinant of performance, can operational hedging be justified.

It may be possible for some companies to immunise their cash flows from foreign exchange rate changes by invoicing in sterling or by adjusting foreign currency prices in order to protect their profit margins. The empirical evidence presented to date suggests that UK companies rely heavily on these strategies as a means of managing currency exposure. This evidence conflicts with the theoretical literature which argues that, with the exception of those companies producing highly differentiated products, it is not possible to effectively protect the cash flows of the firm from the adverse effects of foreign exchange rate movements in this way.



The review of the literature conducted in this chapter has suggested two main areas where further empirical research is necessary. Firstly, there is a need for an up-to-date survey of the extent to which UK companies employ operational means of managing their currency exposure. The last survey to investigate this question was distributed in 1992 (Edelshain, 1995). If British companies are becoming increasingly sophisticated in their management of currency exposure, as Soenen & Aggarwal (1989) suggest, it is likely that the proportion of companies employing operational hedging techniques is now greater than that reported by Edelshain.

The second question requiring further research concerns the extent to which UK firms adjust their pricing policies in order to manage their currency exposure. Empirical research conducted in the late 1980s shows that there is a tendency for British exporters to invoice their foreign customers in sterling. However, following the substantial depreciation in sterling that occurred subsequent to its withdrawal from the ERM in September 1992, it is likely that a number of companies may have abandoned this strategy in favour of invoicing in foreign currency. This is because invoicing in foreign currency allows a company to benefit more directly, in terms of improved profit margins, following a depreciation in its domestic currency. A related question concerns the extent to which British exporters attempt to pass-on the effects of exchange rate changes to their foreign customers in terms of price adjustments. Williamson (1990) suggests that many UK firms adopt a policy of exchange rate pass-through, but this has not been directly investigated.

## **CHAPTER FOUR**

### **The Research Design and Methodology**

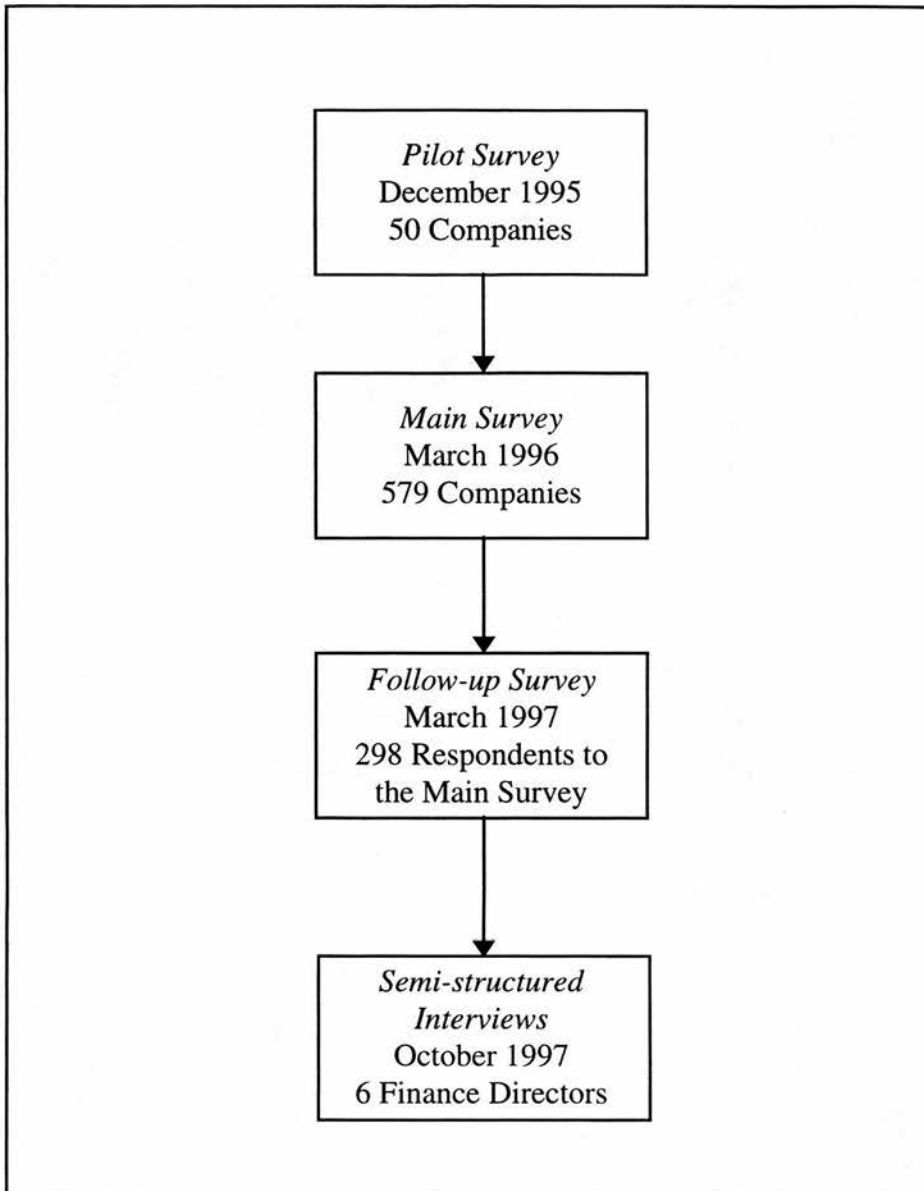
#### **4.1 Introduction**

The empirical research described in the following chapters was conducted using a questionnaire which was mailed to the finance directors of approximately 600 UK non-financial companies in March 1996. Additional information was obtained from a follow-up survey distributed a year later, and also from a small number of interviews which were conducted with the survey respondents. The purpose of this chapter is to justify and explain the research design adopted in this thesis, which is summarised in Figure 4.1.

A major source of concern in the implementation of the research design was the poor response rates which are frequently associated with the use of postal questionnaires. In the field of financial risk management, response rates lower than 25 per cent are frequently reported by researchers. Considerable attention was therefore paid to the means of ensuring a high response rate in the design of the research. As a result, response rates of 51 per cent for the first survey and 79 per cent for the follow-up survey were achieved.

This chapter begins with an analysis of the research methodology and the advantages and disadvantages associated with the use of a postal survey research design. Section 4.3 describes the questionnaire design and the methods used to distribute the surveys and conduct the follow-up interviews. Section 4.4 presents the results of a number of tests which were carried out in order to determine whether the survey findings were affected by non-response bias. The final section summarises and concludes this chapter.

**Figure 4.1: A summary of the research design**



## **4.2 The Research Design**

### **4.2.1 The justification of the research methodology**

The review of the economic currency exposure literature presented in chapters 2 and 3 shows that the theoretical contributions substantially outnumber the empirical studies in this field. Many of the researchers who have conducted empirical research have focused on small samples of multinational corporations, using qualitative methods such as case studies or interviews (for example Walsh, 1986; Belk & Glaum, 1990). The main limitation of this empirical research is that it is not possible to generalise the findings to other types of companies such as exporting, importing and purely domestic firms. In addition, this empirical research has been unable to test many of the hypotheses which have been presented in the theoretical literature regarding the sources of economic exposure. A large scale postal survey was selected as the main research method in this study in order to provide findings that could be generalised to the wider population of UK publicly listed companies.

The major alternative to the use of postal surveys in this research is the 'top-down' methodology outlined in chapter 2. This involves the use of regression analysis to investigate the relationship between company share returns and foreign exchange rates. While this methodology offers an objective measurement of the degree to which a company's value is sensitive to changes in foreign exchange rates, there are a number of limitations associated with its use. Most importantly, it ignores the possibility that a company has an effective hedging programme which has reduced the extent to which its cash flows are affected by exchange rate changes. This is perhaps the main reason why many researchers that have adopted the top-down methodology have reported that only a handful of companies have significant economic currency exposure.

Information obtained from semi-structured interviews and archival data (from the Extel Company Research Database) were used to supplement the findings of the two

postal surveys that were conducted. Combining research methods in this way is referred to as *triangulation* (Fielding & Fielding, 1986). It has been emphasised that the findings arising from multiple research methods should have greater validity and reliability than those arising from a single methodological approach to a research question (Jill & Johnson, 1991). This is because the various strengths and weaknesses of the research methods used will be cancelled out to some extent, which should result in more convincing findings.

The advantages obtained from the use of the of the archival data were two-fold. First, the length of the questionnaire could be reduced because information such as industry membership could be obtained from the database and so did not have to be included in the survey. It was anticipated that by reducing the length of the questionnaire, a higher proportion of the finance directors could be encouraged to respond. The second advantage arose out of the fact that some of the financial information collected from the database overlapped the data obtained from the postal survey. By comparing the data collected from the two sources, it is possible to draw conclusions regarding the accuracy of the questionnaire responses, and ultimately, the validity of the survey.

While it may be possible to generalise the findings arising from the analysis of survey responses and archival data to a wider corporate population, it can be difficult to explain any inconclusive or negative findings using these research methods (Easterby-Smith *et al*, 1991). Semi-structured interviews were incorporated into the research design in order to make it possible to explore some of the issues underlying the responses provided by the survey respondents. The information obtained from the interviews would therefore help to explain any unusual or 'unexpected' survey findings. Furthermore, by discussing the postal survey responses with the interviewees, it was expected that the use of interviews would provide an indication of the extent to which the survey findings could be regarded as reliable.

#### **4.2.2 The strengths and weaknesses of the research methods**

The distribution of large-scale postal questionnaires has become an increasingly used methodology in financial risk management research in recent years. Postal surveys offer the important advantage of allowing a large number of respondents to be contacted in a relatively short period of time at a low level of expense. Furthermore, questionnaires of this type may be completed at a time which is suitable to the respondent. Postal surveys also allow for considered answers to be given and give the respondent the opportunity to consult the necessary documents in order to answer a question accurately. A final advantage of mail surveys is that they provide the respondent with confidentiality and anonymity. This is particularly relevant to surveys of corporate executives which often request the respondents to divulge information which is commercially sensitive. For these reasons, a large scale postal survey forms the basis of the empirical research which is reported in this thesis.

Postal surveys are not without their limitations, however. The most serious limitation associated with their use is the low response rates which are frequently obtained by researchers. In foreign exchange risk management research, response rates as low as 18 per cent have been reported (Batten *et al*, 1993). However, in a recent survey of US Fortune 500 companies, Dolde (1993) achieved a response rate of 51 per cent, which suggests that poor response rates are not a forgone conclusion when postal surveys are used.

Initially, it would appear that the only problem caused by low response rates is that they reduce the sample size of the researcher. But it is not in the numbers of responses that the difficulty arises. Rather, it is the danger that those companies who respond to a questionnaire are different from those who do not respond. This is commonly referred to as 'non-response bias' (Bell, 1993). If only a small percentage of the survey population return completed questionnaires, the researcher cannot be sure that the results adequately represent all subsets of the population (Berdie & Anderson, 1974). Therefore poor response rates have significant implications for the



generalisability of the findings of postal surveys. In the surveys which form the basis of this thesis, it was possible that those companies without significant foreign currency transactions would fail to respond, causing the results to be unrepresentative of the survey population. Obtaining a high response rate to the surveys was therefore an important priority of this study.

Those foreign exchange risk management surveys which have attracted low response rates have two common characteristics. The first is that the questionnaires are long and complex. For example, Edelshain (1995) obtained a response rate of only 20 per cent to his 16 page survey of UK Times 1000 companies. He suggested that the length of his questionnaire was a likely cause of the poor response rate.

*“Although this is not a high response rate, it is not atypical of that experienced by others surveying this complex phenomenon. The questionnaires are lengthy and are addressed to busy executives who frequently complain at the number of requests to participate in surveys they receive each week.”* (Edelshain, 1995, p 142)

A second characteristic of the surveys which have obtained low response rates is that the questionnaires are not sent to specific, named individuals within companies. For example, in the survey conducted by Batten *et al* (1993), the questionnaires were addressed to ‘The Financial Controller’. It is likely, however, that if a company does not have an employee with that precise title, the questionnaire will become lost in the organisation and fail to reach the intended person. Addressing surveys to specific individuals is also important because it personalises the questionnaire, and suggests to the potential respondent that their individual response is considered to be important.

If a high response rate is to be achieved, there are two factors to be considered in the design of a postal survey. First, it is necessary to ensure that the questionnaire will reach the appropriate individual within the organisation, and second, once the questionnaire is received by the appropriate individual, that he or she will be



motivated to complete and return it. In this study, the first aim was achieved by addressing the questionnaires to specific, named individuals. The second aim, encouraging the finance directors to respond, was achieved by three key aspects of the research design:

- a) The use of follow-up mailings to non-respondents, in order to encourage more finance directors to respond.
- b) Careful pilot testing of the questionnaire was undertaken to ensure that the survey questions and instructions were clearly understood by the respondents.
- c) The questionnaire was designed to be short (it consisted of only four pages) and easy to complete.

These important aspects of the survey procedure are described in more detail in section 4.3.

A further limitation of the use of postal surveys in financial risk management research is that the researcher is not present to clarify the questions for respondents, which may lead to inaccurate answers. A related shortfall of postal questionnaires is that they are not an efficient means of capturing unexpected information because the nature of the responses are directly determined by the type of questions included in the questionnaire. It is for this reason that it was decided to conduct semi-structured interviews with a small number of the postal survey respondents.

Semi-structured interviews have been used by a number of researchers in their investigations of corporate currency exposure. The main shortfall associated with this methodology is that the findings cannot usually be regarded as representative of the population as a whole. This is because of the large amount of time and expense required to survey a large sample of companies. As a result, the researchers which adopt this methodology frequently warn that their findings may not be validly generalised to other companies (for example Belk & Glaum, 1990). A further limitation of semi-structured interviewing is that the interviewee may provide responses that he or she believes the interviewer will want to hear, or answers that

will impress the interviewer. Interviewees may also be reluctant to divulge commercially sensitive information due to the lack of anonymity.

Despite these shortcomings, the incorporation of semi-structured interviewing into the research design of this study offered an important advantage. It allowed for further in-depth information to be collected about the economic currency exposure experienced by UK companies. As explained in the following section, the postal questionnaire was short and simplistic in order to encourage the finance directors to respond. This necessarily placed limitations on the amount of information that could be obtained.

## 4.3 The Survey Methods

### 4.3.1 The survey population

The survey population consisted of all exchange-listed UK non-financial companies listed in the Extel Company Research Database as at November 1995 (629 companies in total). The survey focused exclusively on non-financial companies due to the complexity of the foreign currency exposures and risk management techniques of financial companies. Furthermore, it was decided to survey only exchange-listed companies due to the availability of additional financial information. Information such as industry membership, group turnover and other financial information could be obtained from the Extel database, which reduced the number of questions included in the questionnaire.

Unlike most previous surveys of corporate currency exposure, the questionnaire was distributed to all companies in the survey population, regardless of the extent of their international involvement. Many other empirical studies have focused exclusively on multinational corporations (for example Belk & Glaum, 1990; Batten *et al*, 1993, Choi & Prasad, 1995). But the economic currency exposure faced by such corporations is likely to be significantly lower than the exposure of purely exporting or importing companies, due to the 'off-setting' nature of their international cash flows. Even those purely domestic firms which have no foreign currency cash flows were included in the survey population. This enabled the indirect economic exposure experienced by such firms to be investigated.

A random sample of 50 companies was selected from the survey population for the pilot testing of the questionnaire. All of the remaining 579 companies were surveyed in the main survey. The 298 respondents which provided completed questionnaires were surveyed in the 1997 follow-up survey.

### 4.3.2 The survey procedure

#### *The pilot test*

A pilot survey of 50 companies from the survey population was conducted in December 1995. The Finance Director from each of the 50 sample companies was sent a questionnaire package consisting of the questionnaire, a covering letter and an addressed, reply-paid envelope. Each questionnaire was addressed to a named individual listed as the Finance Director in the Extel Company Research database. Where a name was not included in the database, the company was telephoned in order to ascertain the name of the finance director. The purpose of addressing the questionnaires to named individuals was two-fold. Firstly, it increased the likelihood that the questionnaire would reach the intended person and would not become lost in the organisation. Secondly, it made the survey appear more personal, giving the impression that the reply from each individual respondent was considered to be important.

Postage stamps were used as opposed to franking for both the mailing of the survey packet and the reply-paid envelope, in order to make the questionnaire appear more personal. First class postage was used to add to the importance of the survey. The respondents were also given the opportunity to return their questionnaires by fax, but only one of the companies in the pilot test did so. Identification numbers were printed on the back of each questionnaire, which enabled the names of the responding companies to be ascertained. Many of the respondents appeared to be unconcerned about the anonymity of their survey responses, however. Approximately two thirds of the respondents either signed their questionnaire or attached their business card or some other form of company stationery.

Eight days after the initial mailing of the survey, the non-respondents were sent a replacement questionnaire packet, consisting of a questionnaire, reply-paid envelope and a revised covering letter emphasising the importance of the finance director's

response. After a further eight days, a further reminder was made to each non-respondent by telephone. An overall response rate of 68 per cent (34 replies) was obtained. A total of six finance directors returned the questionnaire uncompleted. Four of these executives replied that it was their company policy not to respond to surveys, while two respondents stated that they did not think the questionnaire was relevant to their company. The distribution of these replies between the three contacts made to the finance directors is summarised in Table 4.1.

**Table 4.1: Pattern of responses to the pilot survey**

<b>Contact responded to</b>	<b>Number of replies (% of total respondents)</b>
Initial Mailing	20 (59%)
Follow-up Mailing	11 (32%)
Follow-up Phone Call	3 (9%)
<b>TOTAL</b>	<b>34 (100%)</b>

The above table shows that the majority of the responses were achieved following the initial mailing of the questionnaire. However, the follow-up mailing significantly added to the overall response rate, resulting in approximately one third of the total responses received. The follow-up phone call was not an effective method of eliciting responses, with fewer than 10 per cent of the total responses obtained as a result of this reminder.

The pilot questionnaire asked the finance directors to indicate whether they would be willing to provide additional feedback if contacted. Nine of the respondents offered to give feedback and were contacted by telephone in January 1996. As a result of conversations with these finance directors, some minor alterations were made to the wording of some of the survey questions. In addition, additional response categories were included in the first question, which examined the impact of sterling

depreciation. It was evident, however, that both the questions and instructions were clearly understood by the respondents.

### *The main survey*

Given the success of the pilot study, the main surveys were administered in March 1996 using the same procedure, with two exceptions. Firstly, the use of a follow-up telephone call to elicit additional responses was abandoned. This decision was made in light of the results of the pilot survey which showed that the phone calls did not add significantly to the response rate. The second alteration made to the survey procedure was that a second questionnaire was mailed to non-respondents two weeks after the initial mailing of the questionnaire. In the pilot test, the non-respondents were contacted eight days after the initial mailing. This had resulted in a number of 'cross-overs' of responses and follow-up requests in the post.

### *The follow-up survey*

In March 1997, a second questionnaire was distributed to those finance directors that had responded to the main survey. This follow-up survey was prompted by the substantial appreciation in sterling which had occurred subsequent to the completion of the main survey. It was anticipated that the respondents would report a greater level of economic currency exposure in the follow-up survey due to the size and speed of the appreciation. The non-respondents to the main survey were excluded from the follow-up survey because a large proportion of these finance directors had replied stating that it was their company's policy not to complete postal questionnaires.

### 4.3.3 The survey instrument

The questionnaire used in the main survey (and tested in the pilot study) was carefully designed in order to achieve a high response rate. It was relatively short, consisting of only four pages. The questions were grouped under three main headings which were entitled: “The Effects of Exchange Rate Movements on Your Company”; “Foreign Exchange Risk Management Practices of Your Company”; and “The Characteristics of Your Company”. The questions were ordered so that the most topical and interesting questions appeared first, while those questions regarding financial characteristics appeared at the end of the questionnaire.

For most questions, three-, five- or six-point rating scales were used so that the respondents were only required to tick boxes in order to complete the survey. However, the finance directors were also invited to make additional comments in a space provided at the end of the questionnaire. The use of technical language in the questions was avoided in order to make the survey simple to complete. In the follow-up survey, the questionnaire was designed in a similar way, but consisted of only two pages. Copies of both questionnaires are presented in Appendix A.

A covering letter was sent with the questionnaire, which briefly outlined the purpose of the survey and contained instructions for completing and returning the questionnaire. It was emphasised that the questionnaire should be completed even if the company did not have any foreign currency receipts or payments. Respondents were also advised that if they wished to obtain a summarised copy of the survey results, they should indicate this on their reply. The letters were individually signed and printed on letterhead from the Department of Business Studies at the University of Edinburgh. Copies of the covering letters used in both surveys are presented in Appendix A.



#### **4.3.4 The analysis of the survey data**

The purpose of this section is to provide an overview of the approach taken in the statistical analysis of the survey responses. Detailed descriptions of the statistical tests used are provided in chapters 5 - 7, alongside the relevant results. Most of the statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS). This package was chosen due to the wide range of non-parametric tests it offers and also because it is relatively simple to operate. LIMDEP (an econometrics package) was also used for the multivariate data analysis. This is the most widely used computing package for estimating the parameters of non-linear models such as those involving qualitative dependent variables.

Due to the ordinal or nominal nature of the survey data, it was necessary to employ nonparametric statistical techniques. This analysis of the survey data consisted of three distinct stages:

1. Univariate analysis i.e. a description of the proportion of respondents giving each answer for each of the survey questions.
2. Bivariate analysis i.e. measuring the association between two variables. This involved examining the relationships between responses in different sections of the questionnaires and the relationships between the responses given by the same finance directors in each of the two surveys.
3. Multivariate analysis i.e. analysing the relationships between more than two variables.

In addition to the survey data, financial and industry membership information was collected for each of the responding companies from the Extel Company Research database. The following pieces of information were retrieved from the database:

- Group turnover (1991-95)
- Group net assets (1991-95)
- Group profit before taxation (1991-95)
- Geographical breakdown of group turnover (1991-95)

- Geographical breakdown of group net assets (1991-95)
- Geographical breakdown of group profit before taxation (1991-95)
- FTSE industry classification
- Number of foreign subsidiaries owned

The relationships between a number of these financial characteristics and the answers given by the survey respondents were analysed. Many of these characteristics also formed the basis of the tests of the representativeness of the survey responses (reported in section 4.4).

#### **4.3.5 The follow-up interviews**

In the main survey, 35 per cent of the respondents indicated that they would be willing to provide additional information if they were contacted. Of these respondents, eight were selected to be approached regarding follow-up interviews. Seven of these respondents were based in London in order to reduce the travelling cost and time necessary to conduct the interviews. In September 1997, the eight respondents were contacted by letter asking whether they would be willing to participate in a short interview. A summarised interview schedule was sent with the letter. Copies of the letter and interview schedule are presented in Appendix B. One week after the letters were posted, the interview candidates were contacted by telephone.

Six of the financial executives agreed to participate. The remaining two were not available due to other commitments. The interviews were conducted in October and November 1997. Each interview lasted approximately one hour and was conducted on a semi-structured basis. The interviews were taped in order to ensure that the responses given by the executives were accurately recorded.

## **4.4 The Representativeness of the Survey Respondents**

In this section, the survey respondents and non-respondents are compared in order to test for non-response bias. These tests are conducted for both the main survey (section 4.4.1) and the follow-up survey (section 4.4.2).

### **4.4.1 The main survey**

Of the 579 companies contacted in the main survey, 395 replies were received, representing a response rate of 68 per cent. However 89 of these replies were in the form of a letter, stating that it was not possible for a representative of the company to complete the questionnaire. A further eight responses were eliminated from the survey data as they were too incomplete to be of any use. This resulted in a usable response rate of 51 per cent. This is three times greater than is typical for postal surveys in the field of foreign exchange risk management, which suggests that the topic of economic currency exposure is considered to be an important and topical issue by finance directors. A large number of the survey respondents volunteered additional information on their questionnaires, which provided useful insights into the nature of the currency exposures of their companies.

The replies from most of the 89 companies which stated they would not be participating in the survey explained that it was company policy not to respond to questionnaires. Many commented that this was largely due to the volume of requests received by their companies - one finance director stated that his company received in excess of 100 questionnaires per month. A second reason given frequently was that the finance director considered the questionnaire was not appropriate to their company, due to a lack of involvement in foreign markets. A final reason given with considerable frequency was that the finance director was too busy to respond to the questionnaire. The number of respondents giving each of these reasons is detailed in Table 4.2.

**Table 4.2: Reasons given by respondents for not completing the questionnaire**

<b>Reason Given</b>	<b>Number of Companies (N = 89)</b>
Company policy not to respond to questionnaires	51 (57%)
Questionnaire not applicable to company	23 (26%)
Finance Director too busy to respond	13 (15%)
Other reason	2 (2%)

The 26 per cent of respondents who explained that they did not think the questionnaire was relevant to their company is only slightly greater than the 22 per cent of respondents who rated their sales volumes, profit margins and costs as being highly insensitive to movements in foreign exchange rates (i.e. a rating of '1'). This suggests that companies which think they are not affected by exchange rate fluctuations are adequately represented in the group of companies which returned completed questionnaires.

In order to test for non-response bias, the average net assets, group turnover and profit before tax was calculated for each company in the survey population using information obtained in the Extel Company Research database for the years 1991-1995. The average financial characteristics of the survey respondents were then compared to those of the non-respondents in order to determine whether there were any significant differences. The results are shown in Table 4.3.

The average annual turnover figure for the 298 survey respondents was approximately £710m, as compared to an average for the non-respondents of around £1,223m. When the group of non-responding firms was investigated more closely, it was found that this apparent over-size of the non-responding companies was caused by five firms with a turnover in excess of £10 billion. The group of survey respondents did not contain any firms with a turnover of this magnitude. When these

five companies were removed from the calculation of the average turnover of the non-respondents, the adjusted figure of approximately £729m resembled more closely the average turnover of the survey respondents. The average net assets and profit before tax were also ‘swamped’ by the same five companies in this manner. By removing these companies from the calculation of the average net assets and profit before tax of the non-respondents, the figures were found to be broadly similar to those calculated for the survey respondents.

**Table 4.3: The financial characteristics of respondents and non-respondents**

<b>Financial Information</b> <sup>19</sup>	<b>Survey Respondents (£000)</b>	<b>Survey Non-Respondents (£000)</b>	<b>t-value (2-tailed test)</b> <sup>20</sup>
Average Net Assets	295,604	507,764 <i>Adjusted: (265,858)</i>	.34 (p = .736)
Average Turnover	710,208	1,224,659 <i>Adjusted: (729,020)</i>	-.46 (p = .644)
Average Profit Before Tax	48,453	101,979 <i>Adjusted: (56,036)</i>	-.72 (p = .470)

Independent sample t-tests (based on the ‘adjusted’ data) were conducted in order to test the null hypothesis that the average financial characteristics of the survey respondents and non-respondents were the same. As shown in Table 4.3, this hypothesis cannot be rejected for net assets, turnover and profit before tax. This suggests that the survey respondents are broadly representative of the survey population with respect to these financial characteristics.

<sup>19</sup> Calculated for each company as the average of the financial data for 1991-1995 included in the Extel Company Research database.

<sup>20</sup> t-tests were computed using the adjusted figures for the survey non-respondents.



The information contained in the Extel database also enabled the geographical breakdown of the turnover of the survey respondents and non-respondents to be compared. Table 4.4 shows that, on average, approximately one third of the turnover of the companies in the survey population is derived from overseas sales. The geographical profiles of the turnover of the respondents and non-respondents are remarkably similar, with respect to UK, EC and other foreign sales. Independent sample t-tests confirm that there are no significant differences between the average turnover ratios of the respondents and non-respondents.

**Table 4.4: The geographical breakdown of turnover**

<b>Financial Information</b>	<b>Survey Respondents</b>	<b>Survey Non-Respondents</b>	<b>t-value (2-tailed test)</b>
Percentage Average Turnover : UK	67%	68%	-.02 (p = .984)
Percentage Average Turnover: Other EC	13%	12%	.27 (p = .785)
Percentage Average Turnover: Rest of World	20%	20%	-.16 (p = .870)

In addition to comparing the financial characteristics of the survey respondents and non-respondents, the industry membership profiles of the two groups were compared. This comparison was considered necessary due to a commonly held view that the magnitude of economic exposure faced by individual companies varies considerably across industries (Bodnar & Gentry, 1993). The over-representation of companies from industries such as chemicals and engineering could mean that the survey results over-estimate the magnitude of the economic currency exposure faced by British firms. Table 4.5 compares the industry membership profiles of the survey population and the group of companies that returned completed questionnaires.

**Table 4.5: Industry classification of the survey population and the respondents**

<b>FTSE Industry Classification</b>	<b>Population (n = 629)</b>	<b>Respondents (n = 298)</b>	<b>Population % by Industry</b>	<b>Respondents % by Industry</b>
<i>Breweries</i>	7	1	1.1	0.3
<i>Building &amp; Construction</i>	38	11	6.0	3.7
<i>Building Materials &amp; Merchants</i>	30	13	4.8	4.4
<i>Chemicals</i>	22	9	3.5	3.0
<i>Distributors</i>	27	14	4.3	4.7
<i>Diversified Industrials</i>	19	5	3.0	1.7
<i>Electricity</i>	14	7	2.2	2.3
<i>Electronic &amp; Electrical Equipment</i>	34	19	5.4	6.4
<i>Engineering</i>	66	37	15.7	12.4
<i>Engineering, Vehicles</i>	13	3	2.1	1.0
<i>Extractive Industries</i>	7	6	1.1	2.0
<i>Food Producers</i>	23	10	3.7	3.4
<i>Gas Distribution</i>	2	1	0.3	0.3
<i>Health Care</i>	16	8	2.5	2.7
<i>Household Goods</i>	11	5	1.7	1.7
<i>Leisure &amp; Hotels</i>	22	14	3.5	4.7
<i>Media</i>	41	21	6.5	7.0
<i>Oil Exploration &amp; Production</i>	13	8	2.1	2.7
<i>Oil, Integrated</i>	3	0	0.5	0
<i>Other Services &amp; Businesses</i>	9	3	1.4	1.0
<i>Paper, Packaging &amp; Printing</i>	25	15	4.0	5.0
<i>Pharmaceuticals</i>	11	6	1.7	2.0
<i>Property</i>	8	3	1.3	1.0
<i>Retailers, Food</i>	16	3	2.5	1.0
<i>Retailers, General</i>	46	21	7.3	7.0
<i>Spirits, Wines &amp; Ciders</i>	10	5	1.6	1.
<i>Support Services</i>	38	24	6.0	8.1
<i>Telecommunications</i>	4	3	0.6	1.0
<i>Textiles &amp; Apparel</i>	21	7	3.3	2.3
<i>Tobacco</i>	1	0	0.2	0
<i>Transport</i>	20	12	3.2	4.0
<i>Water</i>	12	4	1.9	1.3



The classifications used in Table 4.5 are based on FTSE industry definitions, obtained from the Extel Company Research database. These results suggest that most industries are relatively well represented in percentage terms in the group of companies responding to the survey. Three notable exceptions are the building & construction, food retailing and breweries industries, which are all relatively under-represented in the sample of survey respondents. However, it is considered that these discrepancies between the industry profile of the survey population and the respondents are not large enough to seriously distort the survey findings. Furthermore, these three industries account for less than 10 per cent of the total survey population.

#### **4.4.2 The follow-up survey**

In the 1997 follow-up survey of the 298 main survey respondents, usable responses were received from 209 companies, representing a response rate of 79 per cent. A further 15 replies were received stating that a representative would not be responding to the follow-up questionnaire. Ten of these replies gave the reason that the finance director who had participated in the main survey in 1996 had subsequently left the company and could not be contacted. Replies from three finance directors stated that the questionnaire was not relevant to them and therefore they would not be responding (despite having participated in the main survey a year earlier!) A further two respondents replied that they were too busy to complete the questionnaire.

As in the main survey, the financial characteristics of the 209 companies which responded to the follow-up survey were compared to those of the 89 non-respondents, in order to test for non-response bias. The results are shown in Table 4.6. The survey respondents are slightly larger (in terms of average net assets) than the non-respondents, but have a smaller average group turnover and profit before tax. However, independent sample t-tests reflect that these differences are not statistically significant. The survey respondents may therefore be regarded as broadly

representative of the survey population with respect to average turnover, profit before tax and net assets. The geographical breakdown of the average turnover of the survey respondents was also compared to that of the non-respondents, as shown in Table 4.6. The results are very similar to those obtained in the testing of the main survey respondents reported in section 4.4.1. They reflect that the average proportion of turnover represented by overseas sales is, on average, identical for the survey respondents and non-respondents.

**Table 4.6: A comparison of the respondents and non-respondents to the follow-up survey**

<b>Financial Information<sup>21</sup></b>	<b>Survey Respondents (£000)</b>	<b>Survey Non-Respondents (£000)</b>	<b>t-value (2 tailed test)</b>
Average Net Assets	293,455	263,969	.56 (p = .575)
Average Turnover	671,575	717,974	-.39 (p = .700)
Average Profit Before Tax	48,541	53,183	-.37 (p = .710)
Percentage Average Turnover : UK	68 %	68 %	.16 (p = .869)
Percentage Average Turnover: Other EC	13 %	12 %	.16 (p = .874)
Percentage Average Turnover: Rest of World	19 %	20 %	-.33 (p = .740)

<sup>21</sup> Calculated for each company as the average of the financial data for 1991-1995 included in the Extel Company Research Database

All of the companies contacted in the follow-up survey had participated in the main survey, carried out a year earlier. It was therefore possible to compare the main survey responses given by the respondents and non-respondents to the follow-up survey. In the main survey, the finance directors were asked to rate the exchange rate sensitivity of their companies' sales volumes, profit margins and costs on a 5-point scale ('1' being highly insensitive). Table 4.7 compares the average exchange rate sensitivity (ERS) ratings given by the respondents and non-respondents to the follow-up survey.

**Table 4.7: The main survey exchange rate sensitivity ratings**

<b>Exchange Rate Sensitivity Ratings</b>	<b>Mean Sensitivity Rating</b>		<b>Kolmogorov-Smirnov Statistic (two-tailed test)</b>
	<b>Respondents (N = 209)</b>	<b>Non-Respondents (N = 89)</b>	
Sales Volumes	2.14	2.08	.1436 (p = 1.000)
Profit Margins	2.50	2.61	.5191 (p = .9504)
Costs	2.38	2.40	.4072 (p = .9964)

The average ERS ratings for respondents and non-respondents, as shown in the above table, are very similar. It was not possible to use an independent samples t-test to test for differences in the ERS ratings provided by the two groups due to the ordinal nature of the data. The Kolmogorov-Smirnov two sample test was therefore used to determine whether the ERS ratings given by the two groups of companies were significantly different. This is a non-parametric test of the null hypothesis that two independent samples have been drawn from populations with the same distribution. Siegel & Castellan (1988) emphasise that the Kolmogorov-Smirnov test is the most powerful test for this purpose.

The large probabilities associated with the Kolmogorov-Smirnov test statistics for each of the three types of exchange rate sensitivity lead us to fail to reject the null hypothesis. They suggest that the differences between the ratings given by the respondents and non-respondents are only random deviations. We can therefore conclude that the respondents to the follow-up survey are broadly representative of the survey population with respect to the ERS ratings obtained in the main survey.

## **4.5 Summary and Conclusions**

This chapter has explained and justified the design of the empirical research which is reported in the following four chapters of this thesis. The most important component of the research design was a large-scale postal survey which was distributed to the finance directors of 579 exchange listed UK non-financial companies in March 1996. In order to gather further information, a follow-up survey was administered in the spring of 1997. Semi-structured interviews with a small number of the survey respondents were also conducted.

The poor response rates which are often obtained by researchers using large scale postal surveys was seen as the most significant factor to be considered in the research design. In order to boost the response rates of the two surveys, the length of the questionnaires was kept to a minimum and the use of technical language was avoided. As a result, response rates of 51 and 79 per cent were achieved for the main and follow-up surveys respectively. This is at least twice the usual response rates obtained by previous surveys carried out in the field of financial risk management. A number of tests of the representativeness of the survey respondents were conducted. The results suggest that the findings of the surveys, which are presented in the following chapters, may be validly generalised to all exchange-listed UK non-financial companies.

## CHAPTER FIVE

### The Nature of Economic Exposure: Survey Evidence

#### 5.1 Introduction

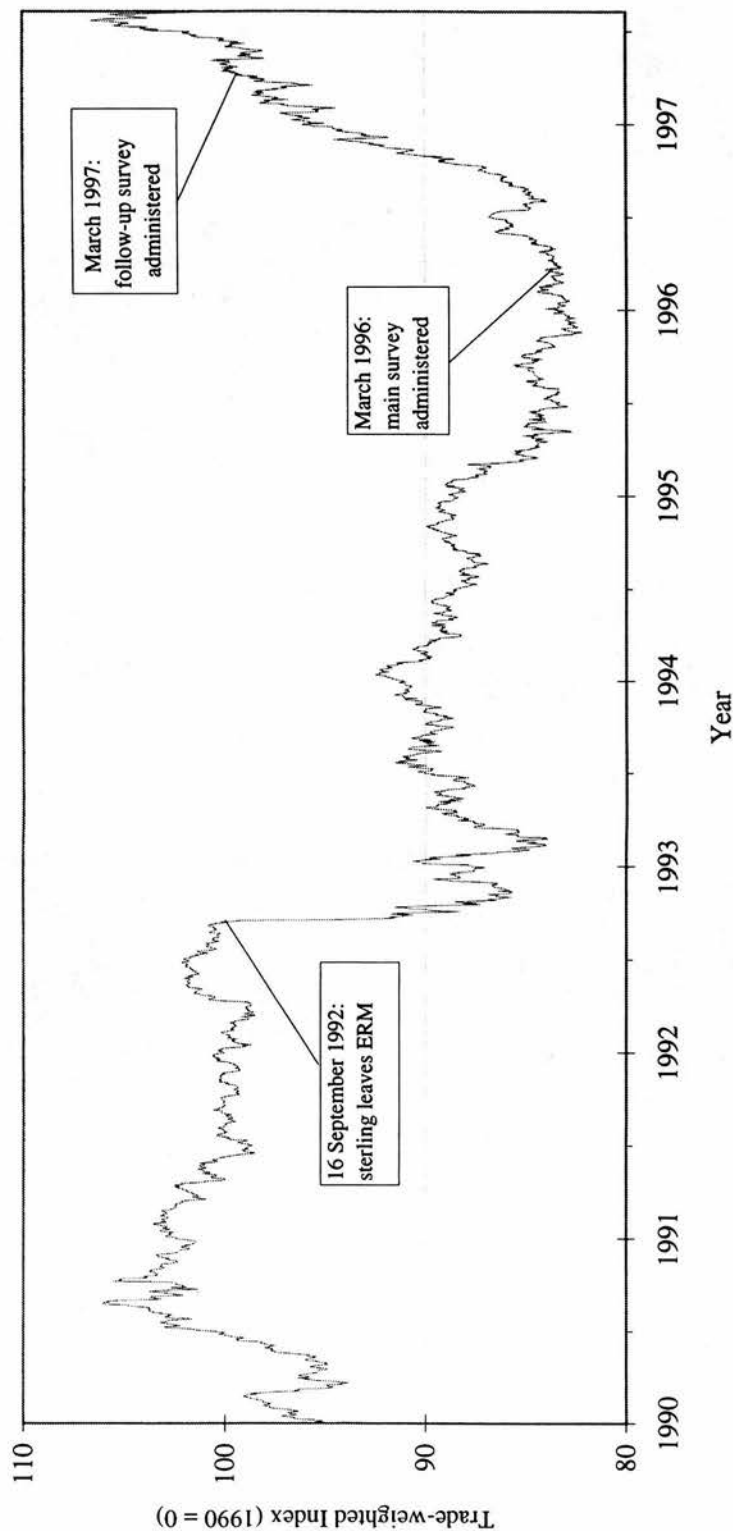
This chapter is a factual account of the findings of the two postal surveys which form the basis of the empirical evidence reported in this thesis. In particular, the purpose of this chapter is to determine the extent to which UK non-financial companies experience economic currency exposure. The theoretical literature (reviewed in chapter 2) suggests that economic exposure is an important problem for most companies, including those that do not source or sell in foreign markets. But suprisingly, the evidence presented in this chapter shows that a large proportion of UK firms have cash flows which are relatively *insensitive* to exchange rate changes.

When interpreting the survey results, it is necessary to consider the changes in the value of sterling which occurred over the time period leading up to the distribution of the questionnaires. Figure 5.1 illustrates that although there had been a trend of gradual depreciation prior to the distribution of the main survey in March 1996, the sterling trade-weighted exchange rate had been relatively stable for a number of years. In contrast, prior the follow-up survey in March 1997, there had been a period of rapid appreciation in the value of sterling. The trade-weighted exchange rate had appreciated by around 15 per cent in the previous six months.

The layout of this chapter is as follows. The following section explores the extent to which UK firms experience a number of hypothesised effects of changes in exchange rates. Section 5.3 presents the survey respondents' estimates of the exchange rate sensitivity of their company cash flows are presented. Section 5.4 investigates the relationship between the reported exchange rate sensitivities and industry membership. In the final section, the results presented in this chapter are summarised.

**Figure 5.1 Sterling trade-weighted index 1990-97**

(Source: Datastream)





## **5.2 The Effects of Exchange Rate Movements**

### **5.2.1 The impact of sterling depreciation**

A depreciation in sterling increases the amount of home currency a UK company receives for a unit of foreign currency. As hypothesised by Walker (1986), this increases the cash flows (in home currency terms) of UK firms which sell their products abroad, as a result of a combination of increased foreign demand and higher profit margins. Also, the reduced price competitiveness of foreign imports may increase the margins and/or sales volumes of UK firms operating in import competing sectors. At the same time, a depreciation in sterling increases the home currency cost of foreign sourced inputs and the servicing costs of foreign currency denominated debt.

The first question in the main survey (distributed in March 1996) asked the respondents to indicate whether their companies had experienced the above hypothesised effects of sterling depreciation. The results obtained are shown in Table 5.1. The most striking result is that 60 per cent of the survey respondents reported an increase in the cost of their foreign sourced inputs as a result of sterling's depreciation. In contrast, the proportion of the survey respondents reporting increased export sales volumes and profit margins is only 35 per cent and 33 per cent respectively. Of those finance directors who indicated that their company had experienced increased sales volumes, 71 per cent reported that their profit margins had also improved. This indicates that there is not a simple trade-off between improving profitability and increasing market share when faced with a depreciation in sterling.

Only a small number of the respondents reported that their companies had experienced exchange rate effects in their domestic markets. Twelve per cent stated that the domestic sales volumes of their company had improved as a result of sterling weakness, while 7 per cent reported increased profit margins on domestic sales. Not

surprisingly, these companies tended to be those facing a relatively high level of foreign competition.<sup>22</sup>

**Table 5.1: The effects of sterling weakness: Survey evidence**

% of Companies ( N = 298 )

Effect	Yes	No	Not Applicable
<i>1. Increased costs of foreign sourced inputs</i>	60 %	17 %	23 %
<i>2. Increased sales volumes in export markets</i>	35	34	31
<i>3. Increased profit margins on export sales</i>	33	36	32
<i>4. Increased debt servicing costs</i>	31	32	37
<i>5. Increased sales volumes in domestic market</i>	12	53	35
<i>6. Increased profit margins in domestic market</i>	7	60	33

The proportion of respondents reporting the exchange rate impact on costs is similar to that reported by Edelshain (1995). In his survey of Times 1000 UK firms, approximately 70 per cent of the respondents reported that their companies were vulnerable to increased costs of imported purchases due to changes in foreign exchange rates. However his findings with respect to the impact of exchange rate movements on export sales are substantially different to those reported in this survey. Edelshain reports that approximately 60 per cent of his respondents are advantaged by increased margins as a result of a devaluation in their home currency, while 61 per

<sup>22</sup> The results relating to the impact of competition on economic exposure are discussed further in chapter 6.

cent are advantaged by improved customer demand. How can these differences between the findings of the present survey and those reported by Edelshain be reconciled? It is likely that these differences are due to the low response rate of approximately 20% obtained by Edelshain. He does not, however, present the results of any tests for non-response bias in his survey findings which means that it is impossible to draw conclusions regarding the representativeness of his survey respondents. It is conceivable that the Edelshain's survey respondents were largely executives who were very concerned about the currency exposures faced by their companies. Such a response bias would account for the high proportion of the respondents who indicated that they had experienced increased margins and/or volumes as a result of sterling depreciation. It is difficult to think of any other reason for the substantial difference between Edelshain's findings and those of the present survey.

### **5.2.2 The impact of sterling appreciation**

An appreciation in sterling reduces the amount of home currency a UK company receives for a unit of foreign currency. This has the effect of reducing the home currency cash flows of British exporters, as a result of reduced foreign demand and/or lower profit margins. In addition, foreign imports become more price competitive, which may reduce the sales volumes or profit margins of companies operating in import-competing sectors. On the other hand, an appreciation in sterling may reduce the home currency cost of foreign sourced inputs and the servicing costs of foreign currency denominated debt. Furthermore, as suggested by Edelshain (1995), the costs of domestic sourced inputs may fall as a consequence of suppliers passing on the benefits of the reduced costs of imported goods to their customers.

In the 1997 survey, the respondents were requested to indicate whether their company had experienced any of the possible effects of the appreciation in sterling. The responses obtained are shown in Table 5.2.

**Table 5.2: The effects of sterling appreciation: Survey evidence***% of Companies ( N = 209)*

<b>Effect</b>	<b>Yes</b>	<b>No</b>	<b>Not Applicable</b>
<i>1. Reduced costs of foreign sourced inputs</i>	64 %	19 %	17 %
<i>2. Reduced sales volumes in export markets</i>	27	44	29
<i>3. Reduced profit margins on export sales</i>	46	27	27
<i>4. Reduced debt servicing costs</i>	39	24	37
<i>5. Reduced sales volumes in domestic market</i>	11	74	15
<i>6. Reduced profit margins in domestic market</i>	16	68	16
<i>7. Reduced costs of domestic sourced inputs</i>	11	77	12

As was the case in the earlier survey, the most widespread effect reported by the respondents was a reduction in the costs of foreign sourced inputs (64 per cent). These results are similar to those obtained by Edelshain, who reports that approximately 60 per cent of his survey respondents are advantaged by reduced costs of imported purchases due to an appreciation in their local currency. Of the survey respondents, 11 per cent indicated that their company had also experienced a reduction in the costs of imports sourced in the domestic market as a result of the increase in the value of sterling.

Approximately half of the survey respondents reported that their companies had experienced reduced profit margins on export sales as a result of the appreciation in sterling. This is significantly greater than the proportion reporting a reduction in export sales volumes (27 per cent), which suggests that many of the surveyed companies were not passing on the impact of the appreciation to their foreign customers at the time the survey was distributed. The large impact of the appreciation in sterling on the profit margins of the responding companies was explained by the finance director of a diversified industrial company as follows:

*“Currency receipts are sold forward to cushion the impact of sterling’s strength, but this only gives a temporary respite for profits, time for the business to react. The initial impact of sterling strength will either be negated by hedging or will impact on profit margins. But over a longer period (12 months plus), the impact will switch more onto sales volumes as we are forced to increase foreign currency prices.”*

This quotation suggests that the large proportion of the respondents reporting reduced export profit margins as a result of sterling appreciation may be due to a reluctance to pass-on the exchange rate effects to customers, at least in the short term. A similar finding was obtained with respect to the impact of the increase in the value of sterling on the domestic markets of the survey respondents. While 11 per cent reported that their companies had suffered a decline in their domestic sales volumes, a larger proportion (16 per cent) indicated that they had experienced a reduction in the profit margins on their domestic sales.

### **5.2.3 A Comparison of the effects of sterling appreciation and depreciation**

The results obtained from the two surveys were compared in order to discover whether the effects of sterling appreciation and depreciation were symmetrical. It was anticipated that there would be an increase in the proportion of respondents

reporting that their company had experienced each of the exchange rate effects in the second survey. The speed and size of the appreciation in sterling in addition to the great deal of attention it received in the financial press made it more likely that the survey respondents would be aware of the impact of exchange rate movements on their companies.

In order to simplify the comparison of the results of the two surveys, the proportions of respondents that responded 'no' or 'not applicable' to each effect are combined. A McNemar test is used to determine whether the differences in the responses given in the two surveys are statistically significant. According to Siegel & Castellan (1988), the McNemar test is the only suitable test for differences in matched pairs of observations where the data is measured on a nominal scale<sup>23</sup>. The null hypothesis of the test is that the median difference between the two responses of the finance directors is zero. If the null hypothesis is true, we would expect approximately half of those finance directors which gave different responses in each survey to have changed their response from 'Yes' to 'No' and the other half to have changed their response from 'No' to 'Yes'. The comparison of the results of the surveys is presented in Table 5.3.

The results show that most of the exchange rate effects were experienced by a greater proportion of survey respondents in the follow-up survey (in which impact of sterling appreciation was investigated). One of the most significant changes between the 1996 and 1997 surveys is in the proportion of respondents reporting that their company had experienced a change in export profit margins. In 1996, 33 per cent of the respondents had experienced an *increase* in export profit margins as a result of sterling depreciation. In contrast, the proportion of respondents reporting a reduction in export margins as a result of sterling appreciation in the 1997 survey was significantly higher, at 46 per cent. A McNemar test reveals that this difference is statistically significant at the .01 level.

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<sup>23</sup> The Wilcoxon signed ranks test is used in section 5.3.1 to test the differences between the exchange rate sensitivity ratings given in both surveys. This test assumes that the data is measured on an ordinal scale and therefore it is not appropriate for the data analysed in this section.

Table 5.3: Comparison of the effects of sterling appreciation and depreciation

Effect	1996 Survey (Increased Costs, Margins & Volumes) (N = 298)	1997 Survey (Decreased Costs, Margins & Volumes) (N = 209)
<b>1. Costs of foreign sourced inputs</b> Yes No/Not Applicable <i>McNemar Statistic = .378</i>	60 % 40 %	64 % 36 %
<b>2. Sales volumes in export markets</b> Yes No/Not Applicable <i>McNemar Statistic = 5.225*</i>	35 % 65 %	27 % 73 %
<b>3. Profit margins on export sales</b> Yes No/Not Applicable <i>McNemar Statistic = 14.841**</i>	33 % 67 %	46 % 54 %
<b>4. Debt servicing costs</b> Yes No/Not Applicable <i>McNemar Statistic = 5.891*</i>	31 % 69 %	39 % 61 %
<b>5. Sales volumes in domestic market</b> Yes No/Not Applicable <i>McNemar Statistic = 1.091</i>	12 % 88 %	11 % 89 %
<b>6. Profit margins in domestic market</b> Yes No/Not Applicable <i>McNemar Statistic = 7.314**</i>	7 % 93 %	16 % 84 %

\*\* = significant at .01 level

\* = significant at .05 level



A similar result was obtained with respect to the impact of exchange rates on the domestic profit margins of the survey respondents. The proportion of companies in the 1996 survey reporting an *increase* in domestic profit margins as a result of sterling depreciation is, at 7 per cent, significantly lower than the 16 per cent of respondents to the follow-up survey who report *decreased* domestic profit margins as a result of the appreciation in sterling. A McNemar test shows that this difference is statistically significant at the .01 level. There is also a significant increase in the proportion of companies reporting the impact of exchange rates on the cost of foreign currency denominated debt in the 1997 survey. Similarly, the percentage of companies reporting *decreased* costs of foreign sourced inputs in the 1997 survey (64 per cent) is greater than the proportion reporting *increased* costs in the 1996 survey (60 per cent), although this difference is not statistically significant.

The above findings provide empirical support for the effects of economic exposure. They illustrate that a significant movement in foreign exchange rates, in this case an appreciation in sterling, can affect not only the costs and revenues of UK firms engaged in foreign trade, but also their profitability within their domestic market. An important qualification to this conclusion is that these results are based on the survey respondents' *perceptions* of the effects of foreign exchange rate movements on their companies. It is therefore possible that the respondents' awareness of the effects of economic exposure was heightened by the numerous articles appearing in the financial press in early 1997 regarding sterling's appreciation.

One surprising result shown in Table 5.3 is that the percentage of respondents that indicated their company had experienced the impact of the exchange rate movement on their export sales volumes was lower in the follow-up survey. Of the respondents to this survey, 27 per cent indicated that their company had experienced *decreased* export sales volumes as a result of sterling appreciation. This is significantly lower than the 35 per cent who stated that their export volumes had *improved* as a result of sterling depreciation in the first survey.

How can this decrease be explained? In contrast to the sustained trend of sterling depreciation which had persisted over the three years prior to the administration of the first survey, the appreciation in sterling experienced by the responding companies prior to the second survey had persisted for approximately six months. As explained by the finance director in the quotation presented in section 5.2.2, it appears that the initial impact of the appreciation in sterling is on profit margins, as companies attempt to protect their market share. The impact of the appreciation on sales volumes is likely to be a longer term effect, not fully captured by the responses to the second survey. This finding is consistent with the anecdotal evidence that appeared in the financial press throughout 1997 indicating that UK export volumes had held up better than expected in light of sterling's appreciation.

#### **5.2.4 The translation effects of exchange rate movements**

While the surveys were concerned solely with the cash flow effects of exchange rate changes, many respondents volunteered additional comments regarding the translation exposure of their companies. Despite its theoretical irrelevance, 28 finance directors (14% of respondents) expressed concern about the impact of sterling appreciation on their companies' translation exposure in the follow-up survey. The majority of these comments focused on the impact of sterling appreciation on the translation of the profits of foreign subsidiaries. The following quotation, from the finance director of an engineering firm, is indicative of the concern of many respondents with the accounting impact of exchange rate movements on their consolidated profits.

*"Translation of reported profits by overseas subsidiaries has an adverse effect on group results reported in sterling."*

Another finance director, from a company in the support services sector, explained that his concern with translation exposure arose out of the reaction of equity analysts

to reductions in profitability resulting from the accounting impact of exchange rate movements.

*“The profits achieved by overseas subsidiaries are translated into sterling at the year end using the average exchange rate ruling throughout the year in question. This can have as big an impact as sales pricing if such an exposure is not hedged..... we have a policy by which the anticipated profits of foreign subsidiaries are hedged by using an average rate option over the currency concerned..... For the current year the use of AVRO’s has protected our profit to the tune of just over £2m, which otherwise would have damaged our prospects of meeting the City’s expectation.”*

This comment appears to be at odds with the theoretical literature discussed in Chapter 2, which suggests that investors are not concerned with the accounting effects of exchange rate changes. The following comments, from the finance directors of a diversified industrial company and a company in the media industry, are more consistent with the theoretical literature which suggests that investors are only concerned with economic reality.

*“A significant effect is that of translation ..... we take the view on this that the important factors is whether the underlying business is healthy.”*

*“We do not seek to ‘hedge’ the exposure on translation of foreign currency profits into sterling unless the profits are being paid to the UK as a dividend from the subsidiary.”*

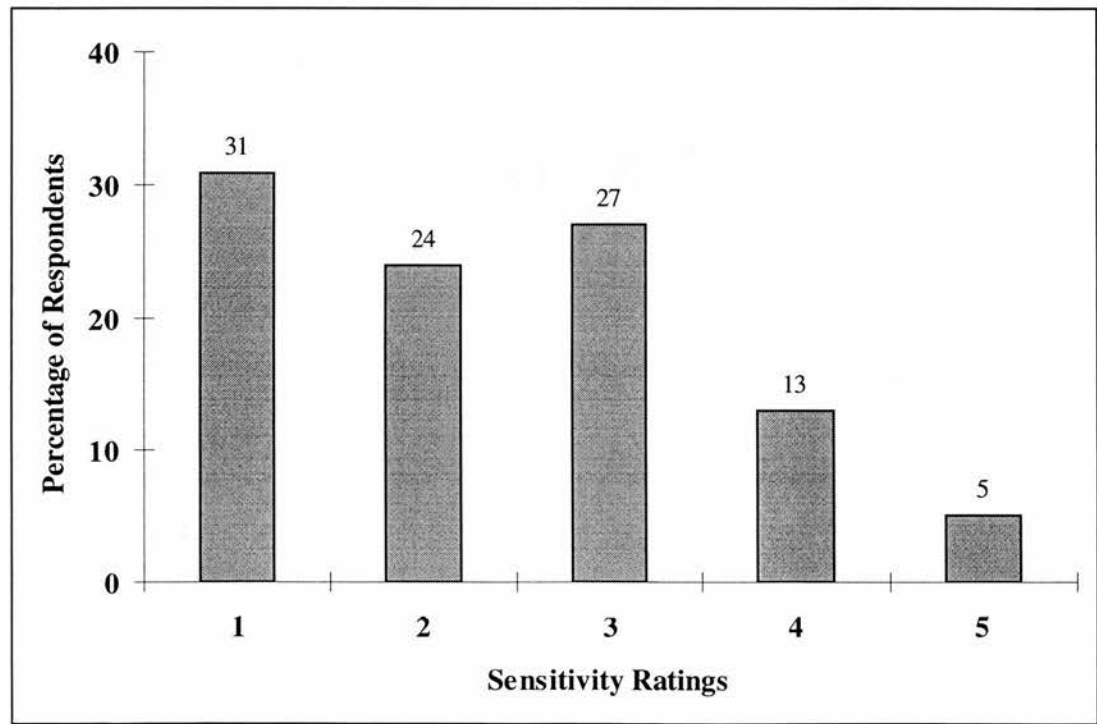
The views expressed in the two quotations presented above cannot be regarded as representative, however. On the whole, the additional comments volunteered by the survey respondents suggest that a large number of UK financial executives remain concerned with the translation exposure of their companies. Furthermore, in a number of cases the respondents appeared to be more concerned with the accounting effects of foreign exchange rate movements than with the impact on their cash flows.

### 5.3 Measures of Exchange Rate Sensitivity

#### 5.3.1 The exchange rate sensitivity ratings

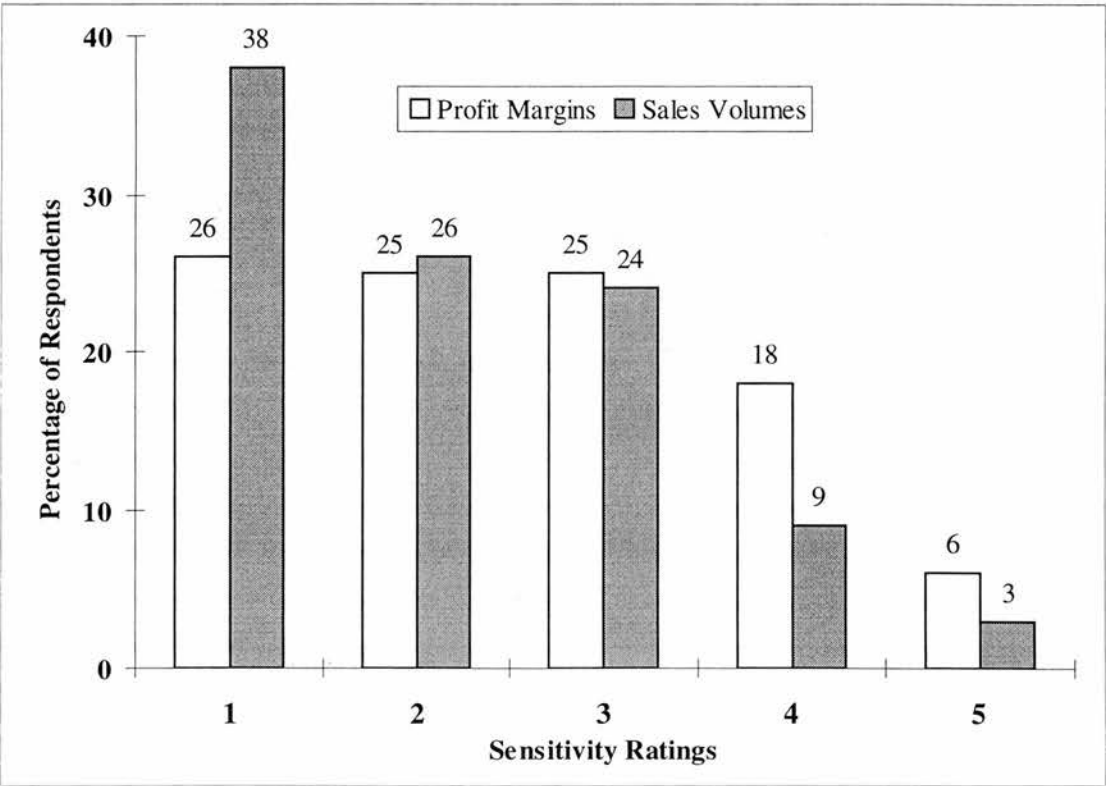
The second question in the main survey requested the respondents to rate the exchange rate sensitivity of their companies' sales volumes, profit margins and costs on a 5-point scale, '1' being highly insensitive. The sensitivity ratings given by the respondents for costs are shown in Figure 5.2. These results reveal that more than half of the respondents perceive the costs of their companies to be relatively insensitive to exchange rate movements (i.e. sensitivity ratings of '1' or '2'). In contrast, fewer than 20 per cent of the respondents indicated that their companies' costs are relatively exchange rate sensitive (i.e. a rating of '4' or '5'). Contrary to expectations, seven of the respondents (44%) who gave an exchange rate sensitivity rating for costs of '5' (highly sensitive) were from companies which sourced 20 per cent or less of their inputs in foreign markets.

**Figure 5.2: The exchange rate sensitivity of costs**



The ratings obtained for the exchange rate sensitivity of sales volumes and profit margins are shown in Figure 5.3. Two main conclusions can be drawn from these results. The first is that a substantial proportion of respondents perceive their company's revenue cash flows to be insensitive to movements in foreign exchange rates. Of the respondents, 38 per cent indicated that the sales volumes of their company are highly *insensitive* to foreign exchange rate movements (i.e. a sensitivity rating of '1'). In addition, more than a quarter of the respondents indicated that their company's profit margins are highly insensitive to foreign exchange rates. The second conclusion is that the profit margins of the responding companies are more sensitive to foreign exchange rates than their sales volumes. This finding is investigated more closely in section 5.3.2.

**Figure 5.3: The exchange rate sensitivity of profit margins and sales volumes**



Not surprisingly, most of the companies that rated their sales volumes or profit margins as highly insensitive to exchange rate movements (i.e. category '1') can be regarded as purely domestic firms, with costs and revenues arising only in the domestic UK market. There were, however, 13 respondents from companies with 60 per cent or more of their sales arising in foreign markets who gave a sales volume sensitivity rating of '1'. An examination of these companies revealed that many were internationally diversified corporations with sourcing and selling markets in many countries. The finance director from one of these companies, an international media group, commented that:

*"We have income and expense all over the world. A natural hedge therefore exists - because as one currency moves, other currencies elsewhere in the world move to compensate for the change."*

Other respondents emphasised that while their company had extensive foreign sales, they also operated foreign based production facilities which shielded their operating cash flows from the impact exchange rate movements. For example, the finance director of a building materials company stated:

*"We operate in UK, US, France and Spain. Each operation services regional markets within those countries. No goods move between operations or countries due to the highly regional nature of products/markets."*

In the follow-up survey, conducted in March 1997, the respondents were again asked to rate the exchange rate sensitivity of the sales volumes, profit margins and costs of their company. It was anticipated that there would be an increase in the proportion of the respondents giving high sensitivity ratings, i.e. '4' and '5', due to the speed and size of the recent appreciation in sterling<sup>24</sup>. Moreover, in light of the attention paid to the appreciation by the financial press it was expected that the responding

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<sup>24</sup> Refer to Figure 5.1 for an illustration of the appreciation in sterling which had occurred over the six months prior to the distribution of the follow-up survey in March 1997.

finance directors would exaggerate the exchange rate sensitivity of their cash flows. Table 5.4 shows the proportion of the respondents giving each of the five sensitivity ratings in both surveys. This comparison shows that the results obtained in both surveys are suprisingly similar.

**Table 5.4: The sensitivity of cash flows to exchange rate movements:  
Survey evidence**

Sensitivity Rating	Sales Volumes		Profit Margins		Costs	
	1996 <sup>25</sup>	1997 <sup>26</sup>	1996	1997	1996	1997
1 (Highly Insensitive)	38 %	35 %	26 %	24 %	31 %	25 %
2	26	28	25	25	24	31
3	24	25	25	28	27	30
4	9	10	18	17	13	12
5 (Highly Sensitive)	3	2	6	6	5	2
<i>Wilcoxon Matched Pairs Test Statistic (2-tailed probability)</i>	-.1048 (p = .917)		-1.089 (p = .276)		-.3037 (p = .761)	

The Wilcoxon signed ranks test was used to test null hypothesis that the sensitivity ratings given by the finance directors in the two surveys are the same. This test is similar to the McNemar test applied in section 5.2.3, but it also takes into account the size of any difference between the two sensitivity ratings given by each respondent. In addition, the Wilcoxon test is appropriate for testing the differences between pairs

<sup>25</sup> Number of respondents for each of the three categories = 298.

<sup>26</sup> Number of respondents for each of the three categories = 209.



of observations where the data is measured on an ordinal scale. As shown in Table 5.4, the two-tailed significance levels associated with the test statistics mean that we cannot reject the null hypothesis that the sensitivity ratings given by the finance directors in both surveys are the same.

A problem associated with the use of the Wilcoxon test is that while it tests whether the *mean* difference in the sensitivity ratings is significantly different from zero, it does not take into account the proportion of the individual respondents giving different ratings in the two surveys. In other words, it would be possible for every respondent to give different sensitivity ratings in each of the two surveys and provided the proportion that increased their rating was similar to the proportion of respondents that reduced their rating, we would conclude that the difference between the two sets of ratings was not significantly different from zero. In order to determine the extent to which the finance directors gave different sensitivity ratings in the two surveys, the individual ratings given by each respondent to both surveys were compared. The results are shown in Table 5.5.

**Table 5.5: Changes in individual sensitivity ratings**

Similarity of individual responses (N = 209)			
Sensitivity Ratings	Unchanged	Changed by 1 rating point	Changed by >1 rating point
Sales Volumes	102 (49%)	69 (33%)	38 (18%)
Profit Margins	111 (54%)	68 (33%)	28 (13%)
Costs	109 (52%)	63 (30%)	37 (18%)

The analysis presented in Table 5.5 shows that approximately half of the respondents to the follow-up survey gave the same sensitivity rating as they gave in the main

survey for each of sales volumes, profit margins and costs. An additional third of the respondents altered their sensitivity ratings by only one rating point. These results therefore suggest that the sensitivity ratings given by most of the survey respondents in the main survey (as illustrated in Figures 5.2 and 5.3) represent relatively accurate assessments of the exchange rate sensitivity of their companies.

### **5.3.2 The profit margin-sales volume trade-off**

The results obtained in both surveys reflect that the profit margins on the responding companies are more sensitive to exchange rate movements than the sales volumes. For example, in the 1996 survey, 24 per cent of respondents gave a profit margin sensitivity rating of '4' or '5' compared to the 12 per cent of respondents who gave these ratings for the exchange rate sensitivity of their sales volumes.

There are three possible reasons why the profit margins of the responding companies appear to be more exchange-rate sensitive than their sales volumes. First, the impact of exchange rates on profit margins is more visible than the impact on sales volumes. The effects of changes in exchange rates on export sales volumes are less obvious because changes in sales levels may be attributed to other factors in the marketplace. Second, the impact of exchange rate movements on profit margins is likely to be a short to medium term effect. In contrast, the impact on sales volumes is likely to occur in the longer term. This is because it may take some time for foreign customers to react to increased prices by reducing their demand for the company's product or switching to competitors.

The third reason why the survey results show profit margins to be relatively more exchange rate sensitive may be explained by the fact that five per cent of the survey respondents belong to the mineral extraction sector. The products of many of these companies and in particular, the oil companies, are priced in US dollars. Such companies do not have the ability to change prices in order to protect their profit

margins. Instead, they are forced to absorb exchange rate fluctuations in their profit margins. This is explained by the finance director of a company from the oil exploration and production sector as follows:

*“Because product sales (oil) are all priced in US dollars, there is no ability to change sales prices to maintain margins in sterling. Competitive pricing pressure does not exist. However strengthening sterling does have a direct negative impact on sterling margins.”*

The respondent who made the above comment gave an exchange rate sensitivity rating for his company's profit margins of '5' (highly sensitive), compared to a rating of '1' (highly insensitive) for his company's sales volumes. The majority of the respondents from companies in the mineral extraction sector gave similar sensitivity ratings.

The main survey findings prompted a closer investigation of the profit margin-sales volume trade-off in the follow-up survey. Respondents from those companies which export their products from the UK were questioned about their pricing reactions to the appreciation in sterling. As explained in chapter 3, following such an appreciation, exporting companies face a choice between maintaining constant prices in terms of their home currency in order to preserve profit margins, or reducing the prices in home currency terms in order to protect their foreign market share. The responses obtained from the 130 exporting respondents to the follow-up survey are shown in Table 5.6. These results show that the most widespread response to sterling appreciation has been to *partially* reduce the prices of exported goods in sterling terms (a strategy adopted by 45 per cent of the respondents). A further 19 per cent indicated that their companies reduced their export prices in sterling terms to the full extent of the appreciation. Only 31 per cent of the exporting respondents indicated that their companies passed through the full impact of the appreciation in sterling to their customers by maintaining constant sterling prices.

**Table 5.6: Pricing reaction to sterling appreciation**

(N = 130)	
Pricing Reaction	% of Exporters
Maintain constant sterling prices	31%
Reduce sterling prices to the full extent of the appreciation	19%
Partly reduce sterling prices	45%
Combination of the above strategies	5%

These findings are somewhat surprising and contrary to the suggestion made by Williamson (1990) that British firms have a tendency to pass-through exchange rate changes to their foreign customers. Such a strategy would require the maintenance of constant sterling prices, while the results of this survey show that fewer than a third the responding companies have adopted such a strategy. In interpreting these results it is, however, important to remember that the trend of an appreciating pound had only existed for six months prior to the distribution of the survey. As pointed out by the respondent quoted on page 118, over a longer time period (i.e. greater than 12 months), it is likely that the impact of a strengthening pound will switch more onto sales volumes as companies are forced to increase their foreign currency prices.

Two of the respondents to the follow-up survey indicated the importance of the pricing reactions of competitors in determining their response to the sterling appreciation. One respondent, from a company in the chemicals sector, commented that "*Foreign currency prices are market driven*". Another respondent explained that his company, in the paper packaging and printing sector, reduced its prices in sterling terms following the appreciation in order to remain competitive.

The pricing reactions discussed above are a possible reason for the relatively small proportion of respondents that rated the sales volumes and profit margins of their

companies as being highly sensitive to changes in foreign exchange rates. For example, those respondents from companies that adjust their foreign currency prices in order to maintain constant margins following an appreciation in sterling may rate their profit margins as being insensitive to changes in foreign exchange rates. Similarly, respondents from companies that reduce their profit margins in order to preserve foreign market share may perceive their sales volumes as being relatively insensitive to currency movements.

In order to test this hypothesis, the relationships between the pricing adjustments and the exchange rate sensitivity ratings reported by the exporting firms were investigated, using a chi-square tests. No significant relationships were found to exist between the pricing reactions of the exporting companies and their exchange rate sensitivity ratings for profit margins and sales volumes. This finding suggests that the ratings estimated by the respondents represent the sensitivity of their volumes and margins to currency movements *before* any pricing adjustments are made. Some support for this conclusion comes from the fact that of the seven respondents from exporting firms to rate their sales volumes sensitivity as a '5' (i.e. highly sensitive), six indicated that they had fully or partially reduced their profit margins following the recent appreciation in sterling. Such a pricing reaction is to be expected from companies with sales volumes that are highly sensitive to changes in foreign exchange rates.



## 5.4 The Economic Currency Exposure of Industry Groups

The purpose of this section is to investigate the extent to which variations in the exchange rate sensitivity ratings given by the main survey respondents can be explained by industry membership. In their study of US, Canadian and Japanese industries, Bodnar & Gentry (1993) found that there were substantial differences in the extent to which the market value of different industries were sensitive to changes in foreign exchange rates. To the author's knowledge, no empirical research has been undertaken to examine the currency exposures of UK industry groups. Studies of the differences in currency exposure at industry level are based on the important assumption that companies in a particular industry are likely to share similar types of international activities, for example exporting, importing, or competing with foreign imports.

In this study, the respondents to the main survey were classified into five sectors: utilities, services, consumer goods, general industrials and mineral extraction. The sensitivity ratings given by the respondents in each of these sectors are summarised in Table 5.7<sup>27</sup>. These results reflect that there is considerable variation in the degree of exchange rate sensitivity across industries. This suggests that it may not be possible to generalise about the impact of movements in foreign exchange rates on British industries because the international operations of the companies which operate within a particular industry are not necessarily homogeneous.

Among the five groups, the utilities sector appears to be the least sensitive to foreign exchange rate movements - 60 per cent of the respondents in this sector gave a sensitivity rating of '1' for their profit margins. Most companies in the services sector also appear to have cash flows which are relatively insensitive to foreign exchange rate movements. This finding is consistent with Bodnar & Gentry's (1993) hypothesis that producers of non-traded goods are less likely to experience economic currency exposure.

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<sup>27</sup> These results are broken down into FTSE industry classifications in Appendix C (Table C.1 - C.3).

**Table 5.7: Exchange rate sensitivity ratings by sector**

<b>Sensitivity Ratings<sup>28</sup></b>	<b>n</b>	<b>1 highly insensitive</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 highly sensitive</b>
<b>Sales Volumes</b>		%	%	%	%	%
<b>All Companies</b>		<b>38</b>	<b>26</b>	<b>24</b>	<b>9</b>	<b>3</b>
Utilities	15	73	20	7	-	-
Services	112	49	26	17	6	2
Consumer Goods	35	34	40	23	-	3
General Industrials	116	21	22	38	16	3
Mineral Extraction	14	57	29	-	7	7
<b>KW = 40.34 (p = .0000)</b>						
<b>Profit Margins</b>		%	%	%	%	%
<b>All Companies</b>		<b>26</b>	<b>25</b>	<b>25</b>	<b>18</b>	<b>6</b>
Utilities	15	60	26	7	7	-
Services	112	38	27	19	12	4
Consumer Goods	35	11	37	26	17	9
General Industrials	116	15	21	32	25	7
Mineral Extraction	14	7	14	43	14	22
<b>KW = 37.09 (p = .0000)</b>						
<b>Costs</b>		%	%	%	%	%
<b>All Companies</b>		<b>31</b>	<b>24</b>	<b>27</b>	<b>13</b>	<b>5</b>
Utilities	15	67	20	2	13	-
Services	112	48	22	17	10	3
Consumer Goods	35	20	11	31	29	9
General Industrials	116	14	29	39	13	5
Mineral Extraction	14	21	21	22	7	29
<b>KW = 40.13 (p = .0000)</b>						

<sup>28</sup> The sensitivity ratings represent the responses to the main survey, distributed in March 1996.



While there is considerable variation in the ratings given by respondents from the consumer goods sector, the costs of these companies appear to be exchange-rate sensitive. Approximately 40 per cent of the respondents from this sector gave a sensitivity rating of '4' or '5' for costs. In particular, the spirits, wines & ciders, food producers and household goods industries all have a high proportion of respondents with costs which are sensitive to foreign exchange rates. This is to be expected, as companies within these industries are often significant importers.

The proportion of respondents from companies in the general industrials sector reporting that their sales volumes and profit margins are relatively sensitive to movements in foreign exchange rates (i.e. a rating of '4' or '5') is higher than average. In particular, a high proportion of the respondents from the engineering, paper, packaging & printing and chemicals industries indicate that their profit margins are highly exchange-rate sensitive. This is not surprising, as companies operating within such industries generally face substantial international competition and produce products which are undifferentiated from those produced by their competitors.

While many companies in the mineral extraction sector appear to have sales volumes which are relatively insensitive to exchange rate movements, a large proportion of respondents from this sector reported that their profit margins are highly sensitive. As explained in the previous section, this is largely due to the existence of a world price for the products produced by such companies which forces them to absorb exchange rate fluctuations in their profit margins.

In order to test whether the differences between the sensitivity ratings between sectors were significantly different from zero, the *Kruskal-Wallis one-way analysis of variance by ranks* (KW) test was used. This is a non-parametric test which requires ordinal measurement of the variable in question, which in this case is the exchange rate sensitivity rating. The null hypothesis of this test is that the five sector samples come from identical populations with the same median. Based on the results shown

in Table 5.7, we can reject the null hypothesis and conclude that the differences in the sensitivity ratings between the five sectors are different (at the .01 level of significance).

Despite the finding that there are significant differences in the exchange sensitivity ratings *between* the five sectors, there remains a great deal of variation in the ratings *within* the sectors. It is clear that even those companies which are members of the same industry are likely to exhibit substantial differences in the magnitude of their economic currency exposure. This is probably because companies within a particular industry may vary greatly with respect to the extent to which they operate in foreign markets or the extent to which the demand for the products or services they produce is sensitive to changes in price. In the following chapter, these and other company-specific determinants of economic exposure are examined in order to attempt to explain why some companies are more sensitive to changes in foreign exchange rates than others.

## 5.5 Summary and Conclusions

The purpose of this chapter was to present the evidence from the postal surveys regarding the nature and magnitude of the economic currency exposure experienced by UK non-financial companies.

The survey findings provide empirical support for the positive and negative effects of economic currency exposure. In contrast to the theoretical literature, which concentrates on the negative impact of currency fluctuations, the results of this study demonstrate that UK companies may also benefit from movements in foreign exchange rates. For example, approximately two-thirds of the survey respondents indicated that their company has experienced a decline in the costs of their foreign sourced inputs following the recent appreciation in sterling. In addition, the survey results show that foreign exchange movements can affect the cash flows associated with the domestic sales of UK firms in addition to those arising from foreign trade.

Despite the widespread support for the effects of economic exposure, it was found that the cash flows of the surveyed companies are generally less sensitive to foreign exchange rate movements than theory would suggest. When asked to rate the exchange rate sensitivity of their sales volumes, profit margins and costs on a five-point scale, more than half of the respondents gave ratings of '1' or '2' ('1' being highly insensitive). This is surprising, given that only 15 per cent of the responding companies may be regarded as 'purely domestic' in the sense that they do not source or sell in foreign markets. At the other end of the scale, only a handful of the survey respondents indicated that their cash flows were highly sensitive to foreign exchange rate changes (5% for costs, 3% for sales volumes and 6% for profit margins).

How can these findings be reconciled with the economic exposure theory which suggests that changes in foreign exchange rates directly or indirectly affect the cash flows of most companies? The high proportion of respondents that see their company's cash flows as being unaffected by exchange rate movements may be due

to a combination of two factors. The first is that many of the firms surveyed are multinational corporations, with both sales and costs arising in foreign currencies. As suggested by Flood and Lessard (1986), these firms are able to achieve a natural hedge from the effects of movements in foreign exchange rates. Anecdotal evidence obtained from a number of the respondents suggests that such companies are likely to be more concerned about their translation currency exposure.

A second factor for the apparent insensitivity of many of the sample firms to foreign exchange rate movements is that the survey respondents may not be aware of their full impact on their company's cash flows. Although the exchange rate sensitivity ratings estimated by the survey respondents in the 1997 survey were broadly similar to those estimated in the earlier survey, the trend of appreciation in the value of sterling had only persisted for around six months when the 1997 survey was distributed. During this time, it is likely that many of the sample firms were protected from the short-term effects of the strengthening pound due to their financial hedging activities. Some of the survey respondents may therefore have been unaware of the long-term effects of a period of sustained appreciation in the value of sterling on their companies.

Another significant finding presented in this chapter is that UK firms appear to be taking a longer term view of foreign exchange rates than suggested by previous researchers (e.g. Williamson, 1990). A large number of the survey respondents indicated that the appreciation in sterling (which occurred prior to the second survey) was absorbed by reducing their companies' profit margins in order to protect market share. Recent evidence appearing in the financial press suggests that due to the sustained strength in the value of sterling, many of UK exporters have now been forced to increase their foreign currency prices.

## CHAPTER SIX

### The Determinants of Economic Exposure: Survey Evidence

#### 6.1 Introduction

The results presented in the previous chapter show that there is substantial variation in the extent to which the cash flows of UK non-financial companies are sensitive to changes in foreign exchange rates. The purpose of this chapter is to explain why some firms are more exposed to exchange rate changes than others and which company-specific characteristics are the key determinants of economic currency exposure.

As explained in Chapter 2, the magnitude of a company's economic exposure can be difficult to determine. This is because the degree to which the future cash flows of a company are sensitive to foreign exchange rates depends not only on the extent of its own international operations, but also on the nature of the markets in which it sells its output and purchases its inputs. Unravelling a firm's economic exposure is therefore a highly complex task.

Previous attempts to investigate the determinants of economic exposure are limited in two ways. The first is that they do not account for the interactions between the explanatory variables. Such interactions can be critical. For example, the economic currency exposure of a company which both sources and sells extensively in foreign markets is likely to be a great deal smaller than that of a similar company which sells in foreign markets, but sources its raw materials entirely in its domestic market. The second limitation of the previous research is that the *indirect* determinants of economic exposure have not been considered. Researchers such as Jorion (1990) and

Choi & Prasad (1995) have concentrated almost exclusively on accounting ratios such as foreign-to-total sales. They have ignored other important determinants such as the extent to which a company's products are differentiated from those of its competitors.

In this chapter, two main approaches are taken in the analysis of the determinants of economic exposure. The first involves the analysis of the bivariate relationships between the exchange rate sensitivity ratings given by the survey respondents and a number of company characteristics. These characteristics include many indirect determinants of economic exposure in addition to the financial characteristics investigated by Jorion (1990) and others. The second approach uses the statistical technique of ordered logit modelling in order to investigate the multivariate relationships between exchange rate sensitivity and its determinants.

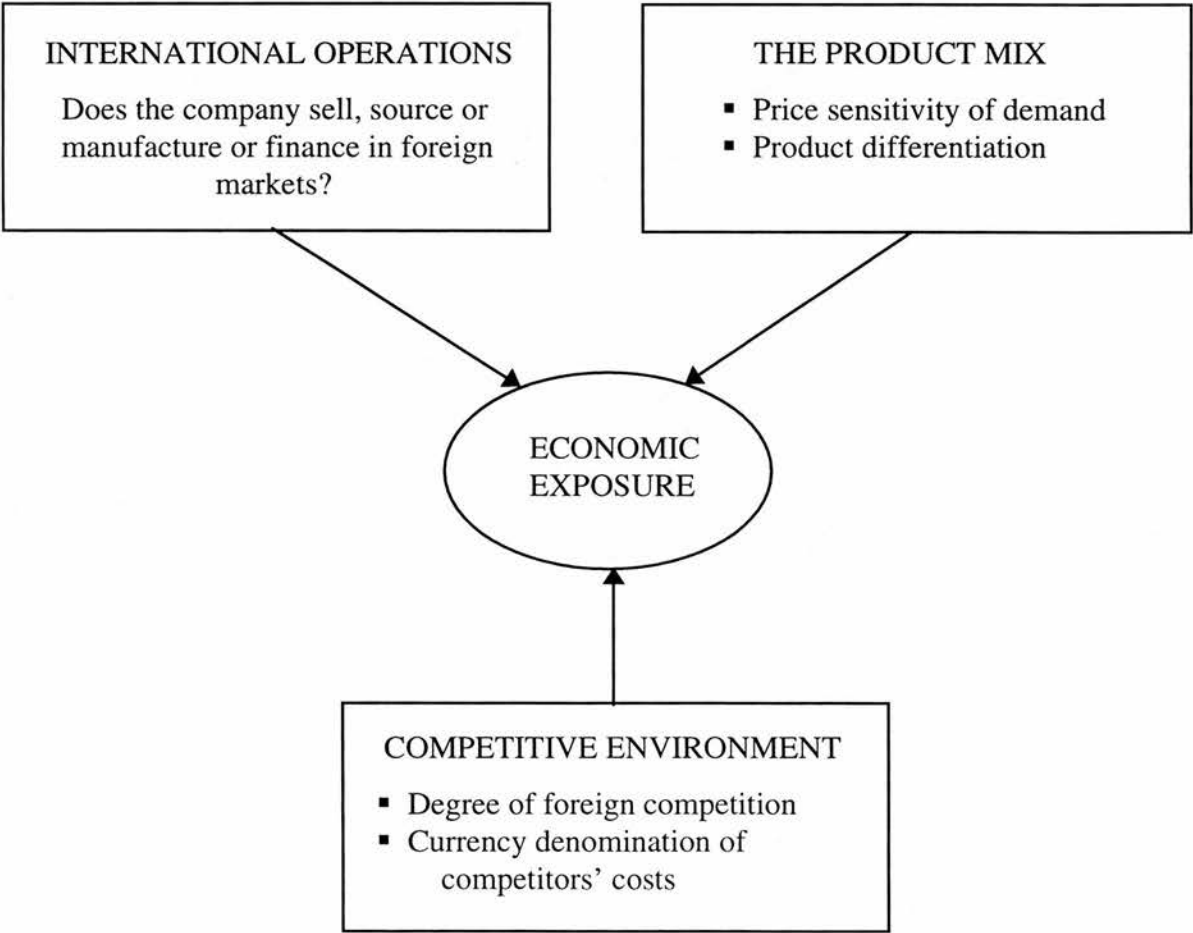
The chapter is set out as follows. The following section details the hypothesised relationships between the company characteristics and foreign exchange rate sensitivity. Section 6.3 presents the results of the bivariate analysis of the determinants of economic exposure. Section 6.4 presents the findings of the ordered logit models. In the final section the results of this chapter are summarised.



## 6.2 Research Hypotheses

This section sets out the hypothesised relationships between a number of firm-specific characteristics and the magnitude of the economic exposure experienced by a company. These characteristics may be categorised as belonging to one of three groups: the nature of the firm's international operations, the nature of its foreign competition, and the nature of the product or service it produces. The following diagram summarises these determinants of economic exposure.

**Figure 6.1: The determinants of a company's economic exposure**





### 6.2.1 The nature of the international operations

The extent to which a company sells, sources, finances or produces in foreign markets are the most obvious determinants of the sensitivity of its cash flows to changes in foreign exchange rates. The greater the involvement of the firm in foreign markets, the larger its economic currency exposure is expected to be. The following hypotheses, based on the theoretical analysis of Moffett & Karlsen (1994) are investigated.

Hypothesis 1: There is a positive relationship between the magnitude of a company's economic currency exposure and the extent to which the company sells its output in foreign markets<sup>29</sup>.

Hypothesis 2: There is a positive relationship between the magnitude of a company's economic currency exposure and the extent to which the company purchases its raw materials or other inputs in foreign markets.

Hypothesis 3: There is a positive relationship between the magnitude of a company's economic currency exposure and the extent to which the company manufactures or produces in foreign markets.

Hypothesis 4: There is a positive relationship between the magnitude of a company's economic currency exposure and the extent to which the company's debt is denominated in foreign currencies.

The *direct* determinants of economic exposure detailed above are measured in two ways. The first is by means of the main survey distributed to finance directors in March 1996. In the questionnaire, the respondents were asked to indicate the extent to which their company sells its products in foreign markets by selecting one of the following categories: no foreign sales; 1 - 20% foreign sales; 21 - 40% foreign sales;

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<sup>29</sup> For this hypothesis and all others, we assume that all other factors remain equal.

41 - 60% foreign sales; 61 - 80% foreign sales; 81 - 100% foreign sales. Similar six-point scales were used to measure the extent to which each responding company sources its inputs in foreign markets, manufactures in foreign countries and employs foreign currency denominated debt.

The second method used for measuring the international operations of the companies involved the use of financial information included in the Extel Company Research Database. This database includes the annual reports for each company and, where appropriate, geographic breakdowns of net assets, turnover and profits. For each responding company the following ratios were computed using an average of the financial information for the previous five years: foreign turnover/total turnover, foreign profits/total profits, and foreign assets/total assets. This approach is similar to that employed by Jorion (1990) and Choi & Prasad (1995).

In addition to the direct relationships which exist between aspects of a company's international operations and its economic exposure, the characteristics outlined in hypotheses 1 - 4 may also interact to determine the extent to which its cash flows are sensitive to changes in foreign exchange rates. Flood & Lessard (1986) postulate that the economic exposure of a firm which sells in foreign markets will be reduced if it sources its inputs in the same currencies that it receives for its sales. By manufacturing in its foreign selling markets or employing foreign currency denominated debt a company can also offset its 'core' economic exposure arising from its foreign currency cash inflows. In this study, the interactions between these aspects of the international operations of the firm are calculated by multiplying the scores for each of the two characteristics together<sup>30</sup>. It is therefore anticipated that each of the resulting interaction terms will be negatively related to the exchange rate sensitivity of the firm. The following hypotheses are proposed.

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<sup>30</sup> If, for example, ratings of '5' and '3' were given for the magnitude of the company's foreign sales and foreign inputs respectively, then the interaction term for hypothesis 5 would be 15.

Hypothesis 5: The interaction between the extent to which a company sells its output in foreign markets and the extent to which it sources its inputs in foreign markets is negatively related to the magnitude of its economic currency exposure.

Hypothesis 6: The interaction between the extent to which a company sells its output in foreign markets and the extent to which it produces or manufactures in foreign markets is negatively related to the magnitude of its economic currency exposure.

Hypothesis 7: The interaction between the extent to which a company sells its output in foreign markets and the extent to which it employs foreign currency denominated debt is negatively related to the magnitude of its economic currency exposure.

### **6.2.2 The nature of the foreign competition**

Compared to the nature of its own foreign operations, the nature of the international competition faced by the firm is a more subtle determinant of its economic currency exposure, but it can be equally as significant. Even those companies which do not source or sell in foreign markets may experience economic exposure if they face significant competition from foreign-based firms in their domestic market (Lessard & Lightstone, 1986). Previous attempts to analyse the determinants of economic exposure appear to have overlooked this point.

It is not only the degree of foreign competition faced by the company in its domestic and foreign markets which is of significance. Shapiro (1992) points out that the extent to which its competitors have costs denominated in similar currencies can be critical in determining a company's economic exposure. Should the company and its competitors have costs denominated in the same currencies, a movement in foreign

exchange rates will have a similar effect on all the firms operating in the market and the economic currency exposure faced by any one firm is greatly diminished. The research hypotheses which relate to the nature of the foreign competition of the firm are as follows:

Hypothesis 8: There is a positive relationship between the magnitude of a company's economic exposure and the extent to which its competitors are based in foreign markets.

Hypothesis 9: There is a negative relationship between the magnitude of a company's economic currency exposure and the extent to which its competitors have costs which are denominated in similar currencies.

These competitive characteristics are measured in the main survey, which asked the respondents to 'rate' their company according to both of these characteristics on a six-point scale.

### **6.2.3 The nature of the product or service**

The nature of the products produced by a company is likely to be an important determinant of the extent to which its revenue cash flows are sensitive to changes in foreign exchange rates. Demirag & Goddard (1994) explain that if a company produces a product for which demand is relatively insensitive to changes in price (i.e. price *inelastic* demand), it has a greater ability to pass on any effects of an adverse change in foreign exchange rates to its customers. On the other hand, should a company sell a product for which consumers are highly price sensitive, it may be forced to absorb any change in exchange rates in its profit margins or else suffer a fall in demand.

Shapiro (1992) points out that the extent to which the product or service produced by a company is differentiated from those of its competitors is also an important determinant of economic exposure. If the company produces a highly branded product or one for which there exist few suitable substitutes, the demand for the product will be price inelastic. As a result, the ability of such a company to pass-through the effects of a change in exchange rates to its customers is far greater than that of a company which produces highly undifferentiated products. The following hypotheses are proposed with respect to the nature of the product produced by the firm.

Hypothesis 10: There is a positive relationship between the magnitude of a company's economic currency exposure and the extent to which the demand for its product/s is sensitive to changes in price.

Hypothesis 11: There is a negative relationship between the magnitude of a company's economic currency exposure and the extent to which its product/s are differentiated from those of its main competitors.

These characteristics are also measured in the main survey, in which the respondents were asked to rate the price sensitivity of demand for their products on a five point scale ('1' being insensitive). They were also requested to indicate rate the extent to which their products are differentiated from their competitors' on a five point scale ('1' being highly undifferentiated).

## **6.3 Bivariate Measures of Association**

The first step in the statistical analysis is to examine the bivariate relationships which exist between each of the hypothesised determinants of economic exposure and the exchange rate sensitivity ratings estimated by the survey respondents.

### **6.3.1 The direct sources of economic currency exposure**

The extent to which a company sells, sources, manufactures or finances in foreign markets are the most direct sources of economic exposure. As explained in section 6.2, these explanatory variables are measured in two ways: using the financial information from the Extel Company Research database and also by requesting the main survey respondents to estimate the extent of their foreign operations.

Three financial ratios were computed for each company: foreign turnover/total turnover, foreign profits/total profits and foreign assets/total assets. The relationships between these ratios and the exchange rate sensitivity ratings given by the respondents for sales volumes, profit margins and costs were analysed using the Spearman correlation coefficient. This is a nonparametric alternative to the Pearson correlation coefficient, that replaces the actual data values with ranks. The correlation matrix is presented in Table 6.1.

As the correlation matrix shows, there exist significant positive correlations between all of the variables. The foreign turnover ratio is more strongly correlated with the exchange rate sensitivity ratings than the foreign profits and foreign assets ratios. In particular, there is a high degree of association between the exchange rate sensitivity of profit margins and the foreign turnover/total turnover ratio. As one might expect, the correlations among the three financial ratios are high, with correlation coefficients between .70 and .75.



**Table 6.1: Correlation matrix: the financial determinants of economic exposure**

<b>International Characteristics</b>	<b>Sales Volume Sensitivity</b>	<b>Profit Margin Sensitivity</b>	<b>Cost Sensitivity</b>	<b>Foreign: Total Turnover</b>	<b>Foreign: Total Profits</b>
<b>Foreign Turnover: Total Turnover</b>	.4494	.5238	.3824		
<b>Foreign Profits: Total Profits</b>	.2767	.3333	.3520	.7443	
<b>Foreign Assets: Total Assets</b>	.3026	.3520	.2668	.7049	.7338

Notes: All correlation coefficients are significant at the .01 level  
N = 298

The findings presented in Table 6.1 are consistent with the US research conducted by Jorion (1990) and Choi & Prasad (1995). Jorion found a positive relationship to exist between the foreign/total turnover ratio and the exposure coefficients he calculated using the ‘top-down’ methodology explained in Chapter 2. Adopting a similar methodology, Choi & Prasad found that there were positive relationships between the exposure coefficients and the foreign turnover, foreign profits and foreign assets of their sample of US multinational corporations.

While the financial ratios of a company may give some indication of the extent to which it sells its products and has assets located in foreign markets, they do not indicate the extent to which the company has costs denominated in foreign currencies. This may arise as a result of a company purchasing raw materials in foreign currencies, manufacturing in foreign countries, or employing foreign currency denominated debt. In the main survey, the respondents were asked to estimate the extent to which their company sells, sources, produces and finances in foreign markets. The results are presented in Table 6.2.



Table 6.2: The international operations of the survey respondents

Category	Foreign sales as a % of total sales		Foreign inputs as a % of total inputs		Foreign production as a % of total production		Foreign currency debt as a % of total debt	
	N	%	N	%	N	%	N	%
None	40	13	30	10	106	36	96	32
1 - 20 %	95	32	129	43	77	26	79	27
21 - 40 %	41	14	51	17	29	10	27	9
41 - 60 %	49	16	43	15	40	13	24	8
61 - 80%	44	15	31	10	29	10	25	8
81 - 100%	27	9	11	4	10	3	45	15
Not Answered	2	1	3	1	7	2	2	1
TOTAL	298	100	298	100	298	100	298	100

The results presented in Table 6.2 show that the vast majority of the responding companies are involved in foreign trade. Only a small minority of the respondents do not source their inputs (10%) or sell their products (13%) in foreign markets<sup>31</sup>. At the other end of the scale, around 40 per cent of the finance directors report that their company sells 41 per cent or more of its output in foreign markets. Approximately two thirds of the respondents have at least some of their production facilities based in foreign countries and a similar proportion report that their company employs foreign currency denominated debt.

In order to explore the relationships between the company characteristics measured in the survey and the magnitude of its economic exposure hypothesised in section 6.2.1, *Goodman and Kruskal's gamma* test was employed. This test was selected due to its suitability for ordinal data and also because it provides information on both the strength and the direction of the relationship between two variables. The gamma statistic is computed as follows:

$$G = \frac{P - Q}{P + Q}$$

Where P is the number of concordant pairs and Q is the number of discordant pairs. In order to understand how the gamma test works, consider the following example, illustrated in Table 6.3. This shows the exchange rate sensitivity ratings ('sensitivity') and the degree of foreign to total sales ratings ('foreign sales') for three companies.

**Table 6.3: An illustration of the gamma test**

Company	Sensitivity	Foreign Sales
Company A	1	2
Company B	3	4
Company C	4	2

<sup>31</sup> These findings may be regarded as broadly representative of the foreign sourcing and selling profiles of all UK non-financial listed companies. This is because the analysis carried out in chapter 4 found that the average the foreign turnover/total turnover ratios of the survey respondents and non-respondents are almost identical.

Consider the two companies A and B. Both of Company B's ratings are larger than the corresponding ratings for Company A. Such a pair of observations is called *concordant*, i.e. the value of each variable is larger (or each is smaller) for one company than for the other company. A pair of observations is *discordant* if the value of one variable for a company is larger than the value for the other company, but the direction is reversed for the second variable. For example, the sensitivity rating is higher for Company C than for Company B, but the foreign sales rating is larger for Company B than for Company C.

A positive gamma statistic arises when the number of concordant pairs exceeds the number of discordant pairs and this indicates that there is a positive relationship between the two variables. If most of the pairs are discordant, this indicates that as the values of one variable increase, those of the other variable tend to decrease and therefore the association is negative. In order to test the significance of the gamma statistics, the ratio of the coefficient to its standard error is computed (labelled  $g/se$  in Table 6.4). When the ratio of the coefficient to its standard error is large, we may conclude that the coefficient is significantly different from zero.

The results presented in Table 6.4 show that there are significant positive relationships between the exchange rate sensitivity ratings and all four of the direct sources of economic exposure. These findings provide support for hypotheses 1, 2, 3 and 4 as they show that the more a company sources, sells, finances or produces in foreign markets, the greater the exchange rate sensitivity of its sales volumes, profit margins and costs will be. The shortfall of the measures of association shown in Table 6.4 is that they do not account for the interactions between the explanatory variables in the determination of economic exposure. These interactions are taken into account in the multivariate analysis of the determinants of economic exposure which is presented in section 6.4.

**Table 6.4: Direct sources of exchange rate sensitivity: Survey information**

<b>International Characteristics</b>	<b>Sales Volume Sensitivity</b>	<b>Profit Margin Sensitivity</b>	<b>Cost Sensitivity</b>
<b>% Foreign Sales</b>	.5174 (g/se = 9.975)	.5807 (g/se = 12.622)	.4502 (g/se = 8.226)
<b>% Foreign Inputs</b>	.3138 (g/se = 4.724)	.4513 (g/se = 7.641)	.4538 (g/se = 7.363)
<b>% Foreign Production</b>	.4129 (g/se = .6.793)	.4308 (g/se = 11.439)	.3798 (g/se = 6.332)
<b>% Foreign Debt</b>	.4299 (g/se = 7.513)	.4555 (g/se = 8.813)	.3602 (g/se = 6.225)

Notes: All correlation coefficients are significant at the .01 level  
N = 298

**6.3.2 The indirect sources of economic currency exposure**

The indirect sources of economic exposure, which relate to the nature of the competition faced by the company and the nature of the products or services it produces, are more difficult to measure. In the main survey, the respondents were asked to answer the following questions (by rating their company on a five-point scale):

- What percentage of your company’s key competitors are based in foreign (non UK) countries?
- What percentage of your company’s main competitors face costs denominated in the same currencies as your company?
- How sensitive is the demand for your company’s main product/s to changes in price?

- To what extent are the product/s sold by your company differentiated from those of your competitors?

The answers given by the survey respondents to these questions are summarised in Appendix C (Tables C.4 - C.7). In order to examine the bivariate relationships between each of the hypothesised indirect sources of economic exposure and the exchange rate sensitivity ratings, *Goodman and Kruskal's gamma* test was employed (as explained in the previous section). The gamma statistics are presented in the following table.

**Table 6.5: Indirect sources of exchange rate sensitivity: Survey information**

<b>Competitive Characteristics</b>	<b>Sales Volume Sensitivity</b>	<b>Profit Margin Sensitivity</b>	<b>Cost Sensitivity</b>
<b>% Foreign Competition</b>	.4529** (g/se = 8.395)	.5576** (g/se = 11.439)	.4184** (g/se = 7.965)
<b>% Foreign Competition with similar costs</b>	-.0652 (g/se = -.956)	.0096 (g/se = .1435)	.0342 (g/se = .5066)
<b>Price Elasticity of Demand</b>	.1781** (g/se = 2.644)	.0374 (g/se = .5490)	.1091 (g/se = 1.612)
<b>Degree of Product Differentiation</b>	.2087** (g/se = 3.166)	.1894** (g/se = 2.925)	.1430* (g/se = 2.223)

\*\* = significant at .01 level

\* = significant at .05 level

The results presented in Table 6.5 provide support for hypothesis 8 as they show that there is a significant positive relationship between the exchange rate sensitivity of the cash flows of the responding companies and the extent to which their competitors are

based in foreign markets. In contrast, the currency cost profile of competitors variable was not found to be significantly related to the exchange rate sensitivity ratings. It was hypothesised that the higher the proportion of the company's competitors that have costs denominated in similar currencies to its own, the less exchange rate sensitive company's cash flows would be (hypothesis 9). This is because if a company has a currency profile of costs which is similar to most of its foreign competitors, then a movement in foreign exchange rates will have a similar effect on all the firms operating in the market. The absence of a significant relationship between this variable and foreign exchange rate sensitivity may indicate that many finance directors are unaware of how the currency profile of their company's competitors can determine their economic exposure. Indeed, a significant proportion of the respondents (11%) were unable to answer this question.

There is also a significant positive relationship between the price sensitivity of demand variable and the exchange rate sensitivity of sales volumes. This finding is consistent with the relationship specified in hypothesis 10. While there is a significant relationship between the exchange rate sensitivity ratings and the extent to which the company's products are differentiated from those of its competitors, the positive direction of this relationship is difficult to interpret. It was anticipated (hypothesis 11) that this variable would be negatively related to exchange rate sensitivity, because the more differentiated a company's products, the greater its ability to pass on the effects of exchange rate movements to its customers, in the form of price changes.

A small number of the survey respondents volunteered additional comments which emphasised the importance of the firm's foreign competition in determining the extent of its economic exposure. For example, the finance director of a company in the telecommunications sector commented:

*"Competition maintains pressure on our costs, revenues and margins."*

Another finance director, from a company in the engineering sector emphasised the importance of the currency profile of competitors as follows:

*“When we are competing for overseas contracts, the impact of exchange rate movements is critical when our competition is established or comfortable in that currency. For example, China buys/contracts in US dollars - therefore it is very difficult for us to compete with a US supplier.”*

In contrast, other respondents emphasised that the nature of their competition actually reduced the magnitude of their companies' economic exposure. For example, the finance director of a diversified industrial company commented:

*“Economic exposure is only a risk if it doesn't change our competitors' positions as well.”*

Another finance director, from a company in the mining sector emphasised the importance of the currency denomination of competitors' costs as follows:

*“Although our costs may be denominated in many different currencies, they are denominated in a similar way to our competitors.”*

Respondents also emphasised that the differentiation of their products from those of their competitors means that the economic exposure faced by their companies is minimal. For example, the finance director of a company in the support services industry commented:

*“Because the products are unique (or nearly so) they are not as price sensitive as they might otherwise be. Therefore, to a degree, foreign exchange fluctuations can be absorbed.”*

While another finance director of an engineering company stated:



*“Our exports tend to be high-added value products (i.e. not commodity products) where approvals, reputation, customer specification etc are more important than price.”*

The results presented in this section suggest that the extent to which a company sells, sources, finances and produces in foreign markets and faces competition from foreign-based companies are the most important factors which determine a company's economic exposure. The absence of significant relationships between the more indirect hypothesised sources of economic exposure and the exchange rate sensitivity ratings does not necessarily mean that these characteristics are not important. It is possible that this is a reflection of a lack of understanding among finance directors of the factors which cause their company cash flows to be sensitive to movements in foreign exchange rates.

## 6.4 Multivariate Analysis: The Ordered Logit Approach

The next step in the analysis of the determinants of economic exposure is to investigate the multivariate relationships that exist between the exchange rate sensitivity of the responding companies and the explanatory variables. If the dependent variable (i.e. the foreign exchange rate sensitivity ratings) could be regarded as continuous, it would be possible to employ multiple linear regression analysis. In this study, however, the dependent variable is *ordinal*, i.e. the responses are coded 1, 2, 3, 4 or 5. In this case, linear regression is not appropriate because it would treat the difference between a 1 and a 2 the same as that between a 4 and a 5, while in fact they are only a ranking. A suitable alternative, initially adopted by McKelvey & Zavoina (1975) is *ordered logit modelling*. This is the first study of the determinants of economic currency exposure to apply this technique.

The term 'logit', from which this technique's name is derived, refers to the natural logarithm of the odds. At the simplest level, the odds indicate the relative probability of falling into one of two categories with respect to a particular characteristic. For example, consider a population of companies in which the probability of a firm having costs which are highly *sensitive* to foreign exchange rate movements is .40 and the probability of a firm having costs which are highly *insensitive* to such movements is .60. The odds of a firm having costs which are highly sensitive is therefore .67 (.40/.60). This means that the companies in this population are about two thirds as likely to have costs which are highly sensitive to foreign exchange rate movements as they are to have costs which are highly insensitive.

In a multivariate logit model, it is the *conditional* odds of foreign exchange rate sensitivity given a number of company-specific characteristics which is of interest. Using this technique, the conditional log odds of foreign exchange rate sensitivity is expressed as a linear function of a number of explanatory variables. Ordered logit modelling is therefore similar to linear regression except that the dependent variable is expressed as a log odds rather than as a metric variable.

### 6.4.1 Methodology

As discussed by Greene (1993) and Sawkins *et al* (1997), an ordered logit model is set up in the following way. Consider an underlying latent variable model of the following form:

$$y^* = \beta x + \varepsilon$$

where  $y^*$  is the unobserved dependent variable,  $x$  is a vector of explanatory variables,  $\beta$  is an unknown parameter vector and  $\varepsilon$  is the error term. While  $y^*$  is unobserved, we do observe the following:

$$\begin{aligned} y &= 0 & \text{if } y^* \leq 0 \\ y &= 1 & \text{if } 0 < y^* < \mu_1 \\ y &= 2 & \text{if } \mu_1 < y^* \leq \mu_2 \\ &: \\ y &= J & \text{if } \mu_{J-1} < y^* \end{aligned}$$

Where  $y$  is the exchange rate sensitivity rating<sup>32</sup> and  $\mu$  is the vector of unknown threshold parameters to be estimated using the  $\beta$  vector.

The probability of observing a particular exchange rate sensitivity rating can be therefore written as follows:

$$\text{Prob } [y_i = j] = \text{Prob } [y^* \text{ is in the } j\text{th range}]$$

As illustrated in Figure 6.2, this can be rewritten as:

$$\text{Prob } [y_i = j] = F [\mu_j - \beta x_i] - F [\mu_{j-1} - \beta x_i]$$

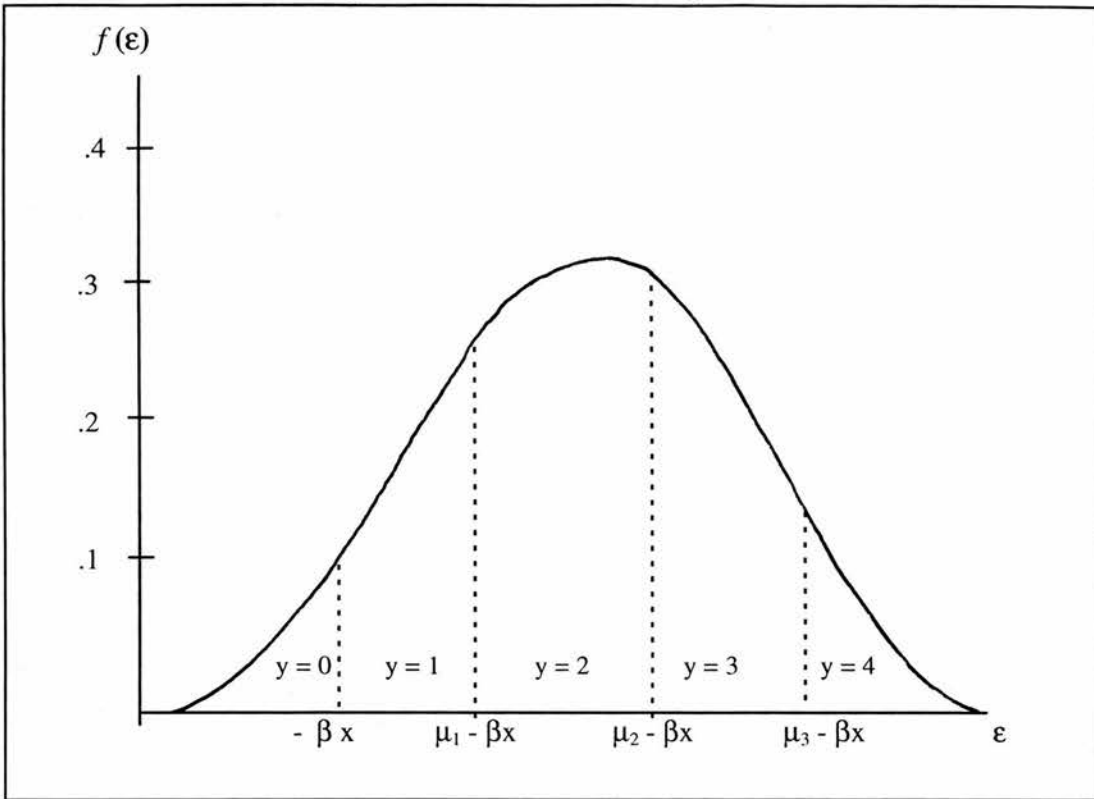
Where  $F(.) = \exp(.) / [1 + \exp(.)]$

$$\text{Therefore: } \text{Prob } [y_i = j] = \frac{1}{1 + e^{-\mu_j + \beta x_i}} - \frac{1}{1 + e^{-\mu_{j-1} + \beta x_i}} \quad (6.1)$$

Equation 6.1 can then be used to derive a likelihood function and subsequently, maximum likelihood estimates of  $\mu$  and  $\beta$ .

<sup>32</sup> Note that the LIMDEP computer package used for this analysis requires the dependent variable to be coded 0 - 4 as opposed to the original scale of 1 - 5 which was presented in the survey.

**Figure 6.2: The ordered logit model<sup>33</sup>**



The ordered logit models are estimated using the LIMDEP econometrics package (version 7.0). The estimated coefficients of the ordered logit equations are interpreted in a different way to the coefficients produced by linear regression models. A positively signed coefficient for a particular explanatory variable indicates an increase in the log of the odds ratio, i.e. higher values of these explanatory variables imply greater exchange rate sensitivity<sup>34</sup>. Meanwhile, the 'z' score given for each coefficient is a pseudo *t*-statistic. This is computed by the LIMDEP package as the ratio of the coefficient to the standard error.

The evaluation of each overall model is based on three statistics: *pseudo R<sup>2</sup>*, *log likelihood* and *model chi-square*. The *log likelihood* is a measure of how poorly the

<sup>33</sup> Adapted from Greene (1993) Figure 21.3, p 673.

<sup>34</sup> For example, the coefficient on the fsales variable in model V2 is .4960. The exponent of this figure is  $e^{.4960} = 1.642$ . This means that the odds of exchange rate sensitivity increase by a factor of approximately 1.6 if a company has, for example, 21 - 40% of its total sales represented by foreign sales, as opposed to 1 - 20% foreign sales.

logit model fits with all of the independent variables included. It is analogous to the statistical significance of the unexplained variance in a linear regression model. The *model chi-square* statistic computed for the ordered logit model is similar to the F test in linear regression. It provides a test of the null hypothesis that  $\beta_1 = \beta_2 = \dots = \beta_k = 0$ . If the model chi-square statistic is statistically significant, we can reject the null hypothesis and conclude that information about the independent variables allows us to make better predictions of  $\Pr(y_i = j)$  than we could make without them. It is therefore desirable to have a model chi-square statistic that is statistically significant and a log likelihood statistic that is not, but, according to Menard (1995), it is possible for both to be significant in ordered logit models based on large samples.

The *pseudo  $R^2$*  statistic does not appear in the output produced by the LIMDEP package. It is calculated using the equation suggested by Aldrich & Nelson (1984) as follows:  $G_M/(G_M + N)$ . Where  $G_M$  is the model chi-square statistic and  $N$  is the number of cases. It measures how well the independent variables, as a group, explain the dependent variable and it is equal to zero when the independent variables are unrelated to the dependent variable.

Six ordered logit models are estimated: three for the exchange rate sensitivity of sales volumes - models V1, V2 and V3 and three for profit margins - models M1, M2 and M3. Models V1 and M1 are based on the approach taken by Choi & Prasad (1995), in which only financial ratios are considered as explanatory variables. The three variables considered are: foreign/total turnover (*fturnover*), foreign/total profits (*fprofits*) and foreign/total assets (*fassets*). These ratios are measured using financial information from the Extel Company Research Database, as described in section 6.2.1.

In models V2 and M2, the company characteristics measured in the main survey are included as the explanatory variables. The eight determinants which are analysed in Tables 6.4 and 6.5 are included in the model. These eight variables are also included in Models V3 and M3, but in addition, these models incorporate three interaction



terms as explanatory variables. These interaction terms are described in section 6.2.1. They allow for the way in which the aspects of the international operations of a company interact to determine its economic exposure. For example, a company which both sources and sells significant amounts in foreign markets is expected to be less sensitive to foreign exchange rate movements than a company which only sells in foreign markets.

#### **6.4.2 Results**

The results for the ordered logit models are shown in Tables 6.6 (for sales volumes) and 6.7 (for profit margins). A description of the explanatory variables is presented in Table 6.8. Models V1 and M1 include only financial ratios as explanatory variables. In both of these models, the coefficient on the foreign turnover ratio (*fturnover*) is positive and significant. This indicates that the higher the proportion of a company's turnover which arises from sales in foreign markets, the greater the exchange rate sensitivity of its profit margins and sales volumes. There is also a significant positive coefficient on the foreign profits ratio in Model M1 (profit margin sensitivity). These findings are similar to those obtained by Jorion (1990), who found a positive relationship to exist between economic currency exposure (measured using the 'top-down' method) and the ratio of foreign to total sales.

In models V2, M2, V3 and M3, the survey responses were used as the explanatory variables. In all four models, the coefficient on *fsales* is positive and statistically significant (at the .01 level). This is consistent with the relationship specified in hypothesis 1 and indicates that as the foreign: total sales ratio increases, the exchange rate sensitivity of a company's sales volumes and profit margins also increases. In contrast, the coefficient on the *finputs* variable is only significant in model M3. The positive sign on this coefficient provides support for hypothesis 2 by indicating that there is a positive relationship between the extent to which a company sources its inputs in foreign markets and the exchange rate sensitivity of its sales volumes.

Table 6.6: Ordered logit model results (sales volume sensitivity = dependent variable)

Variables	Model V1		Model V2		Model V3	
	coefficient	z	coefficient	z	coefficient	z
<i>Constant</i>	2.118	5.31***	-2.248	-3.59***	-5.1567	-6.052***
<i>Fturnover</i>	3.860	5.52***				
<i>Fprofits</i>	1.075	1.43				
<i>Fassets</i>	.367	.484				
<i>Fsales</i>			.4960	3.29***	1.3101	5.794***
<i>Finputs</i>			-.1748	-1.19	.3766	1.079
<i>Fproduction</i>			-.00512	-.037	.6324	1.499
<i>Fdebt</i>			.1787	1.99**	.4954	1.727*
<i>Fcompetition</i>			.0723	.625	-.0040	-.036
<i>Costcompetitors</i>			-.0708	-.772	-.0920	-.945
<i>Sensitivity</i>			.2873	2.56***	.2736	2.374**
<i>Differentiation</i>			.1192	1.05	.1736	1.449
<i>Fsales*finputs</i>					-.1378	-1.507
<i>Fsales*fproduction</i>					-.1215	-1.124
<i>Fsales*fdebt</i>					-.0816	-1.191
<i># observations</i>	273		252		252	
<i>pseudo R<sup>2</sup></i>	.17		.24		.29	
<i>Log likelihood</i>	-343.13		-307.97		-297.01	
$\chi^2$	57.24 (p = .000, df = 3)		80.104 (p = .000, df = 8)		102.017 (p = .000, df = 11)	
$\mu_1$	1.3012		1.4152		1.5312	
$\mu_2$	2.9114		3.2112		3.3561	
$\mu_3$	4.6943		5.0235		5.1844	

\*\*\* = significant at .01 level

\*\* = significant at .05 level

\* = significant at .10 level



Table 6.7: Ordered logit model results (profit margin sensitivity = dependent variable)

Variables	Model M1		Model M2		Model M3	
	coefficient	z	coefficient	z	coefficient	z
<i>Constant</i>	3.373	8.022***	-1.654	-2.866***	-3.632	-4.330***
<i>Fturnover</i>	4.594	6.404***				
<i>Fprofits</i>	1.479	2.062**				
<i>Fassets</i>	-0.071	-0.097				
<i>Fsales</i>			.4472	2.770***	1.0384	4.133***
<i>Finputs</i>			.1939	1.388	.94990	2.937***
<i>Fproduction</i>			-.2470	-1.730*	-.01724	-.040
<i>Fdebt</i>			.2139	2.417**	.27016	.950
<i>Fcompetition</i>			.2990	2.546**	.28062	2.356**
<i>Costcompetitors</i>			.0433	.481	.0248	.263
<i>Sensitivity</i>			.0285	.276	-.00723	-.069
<i>Differentiation</i>			.0018	.016	.0040	.035
<i>Fsales*finputs</i>					-.1897	-2.072**
<i>Fsales*fproduction</i>					-.0353	-.315
<i>Fsales*fdebt</i>					-.0146	-.213
<i># observations</i>	274		253		253	
<i>Pseudo R<sup>2</sup></i>	.24		.31		.33	
<i>Log likelihood</i>	-373.83		-329.76		-322.84	
$\chi^2$	86.52 (p = .000, df = 3)		111.26 (p = .000, df = 8)		125.12 (p = .000, df = 11)	
$\mu_1$	1.3496		1.5030		1.6132	
$\mu_2$	2.7824		3.1013		3.2188	
$\mu_3$	4.4213		4.8973		4.9919	

\*\*\* = significant at .01 level

\*\* = significant at .05 level

\* = significant at .10 level

**Table 6.8: Description of the explanatory variables**

<b>Variable</b>	<b>Description</b>
<i>Fturnover</i>	Ratio of foreign turnover to total turnover, using financial information from the Extel database.
<i>Fprofits</i>	Ratio of foreign profits to total profits using financial information from the Extel database.
<i>Fassets</i>	Ratio of foreign net assets to total net assets using financial information from the Extel database.
<i>Fsales</i>	Foreign sales as a % of total sales (rated 1 - 6, '1' being no foreign sales).
<i>Finputs</i>	Foreign inputs as a % of total inputs (rated 1 - 6, '1' being no foreign inputs).
<i>Fproduction</i>	Foreign production as a % of total production (rated 1 - 6, '1' being no foreign production).
<i>Fdebt</i>	Foreign debt as a % of total debt (rated 1 - 6, '1' being no foreign debt).
<i>Fcompetition</i>	Foreign competitors as a % of total competitors (rated 1 - 6, '1' being no foreign competitors).
<i>Costcompetitors</i>	Proportion of competitors that have costs denominated in similar currencies (rated 1 - 5, '1' being 1 - 20% of competitors).
<i>Sensitivity</i>	Sensitivity of demand to changes in price of the company's product (rated 1 - 5, '1' being highly insensitive).
<i>Differentiation</i>	Extent to which the company's product/s are differentiated from those of its competitors (rated 1 - 5, '1' being highly undifferentiated).

The coefficient on *fdebt* is significant in models V2, V3 and M2 and has the sign specified in hypothesis 4; companies that have a higher proportion of their debt denominated in foreign currencies have sales volumes and profit margins that are more sensitive to changes in foreign exchange rates. This is to be expected given that companies which employ large amounts of foreign currency debt are also likely to have high levels of foreign sales. In contrast, the coefficient on the *fproduction* variable is significant in only one of the models, M2. It is interesting, however, that the coefficients on this variable are negative in three of the models (including M2). It was hypothesised that there would be a positive relationship between a company's foreign exchange rate sensitivity and the extent to which it produced its products in foreign countries (hypothesis 3). A likely explanation for the negative relationship is that companies which have production facilities in foreign countries achieve a kind of 'natural hedge'. This causes their sales revenues to be less sensitive to changes in foreign exchange rates than those companies that export goods produced in domestic based facilities.

Turning to the variables which measure aspects of the company's competitive environment, the coefficient on the *fcompetition* variable is significant and positive in models M2 and M3. This is consistent with expectations (hypothesis 8) and indicates that the more foreign competition a company faces, the more exchange rate sensitive its profit margins are likely to be. The coefficients on the *fcompetition* variable are not significant in the sales volume models, however.

The results indicate that there is no significant relationship between the currency cost profile of a company's competitors (the *costcompetitors* variable) and the extent to which its profit margins and sales volumes are sensitive to changes in foreign exchange rates. This indicates a lack of empirical support for hypothesis 9, which is based on the argument presented by Shapiro (1992) that the exchange rate sensitivity of a company is diminished if most of its competitors have similar economic exposure profiles. The absence of a significant relationship may be simply due to a lack of awareness on the part of the responding finance directors of the currency cost

profile of their competitors. As explained earlier, 11 per cent of the respondents were unable to estimate the extent to which their competitors faced costs denominated in similar currencies to their own company.

Of the two variables that relate to the nature of the company's product, the *sensitivity* variable has a highly significant positive coefficient in models V2 and V3. This provides support for hypothesis 10 by indicating that the greater the price sensitivity of demand for the company's products, the more sensitive its sales volumes will be to changes in foreign exchange rates. The other variable, *differentiation*, is insignificant in all four models. The ordered logit models therefore do not provide support for hypothesis 11.

Models M3 and V3 also incorporate a number of interaction terms. These are included to account for the 'natural hedges' which may be constructed by companies. For example, a company may source its inputs in the same currency it receives for its sales, thereby reducing its net exposure to that particular currency. As specified in hypotheses 5, 6, and 7, a negative relationship between foreign exchange rate sensitivity and the interaction terms is anticipated. The results in Tables 6.6 and 6.7 show that the coefficients on each of the three interaction terms are indeed negative in both models. Only one of these terms, the *fsales\*finputs* interaction, is significant, however. This provides some support for the argument that firms may reduce their economic currency exposure by constructing natural hedges.

The chi-square statistics for all six of the models are significant. This indicates that in each model, the proportion of the variance in the dependent variable explained by the independent variables is statistically significant. The pseudo  $R^2$  statistics for each of these models are also reasonable. In models M1 and V1, the financial ratios explain 24% of the variation in the profit margin exchange rate sensitivity ratings and 17% of the variation in the ratings for sales volumes. For models V2 and V3, pseudo  $R^2$ s of 24% and 29% were obtained. This suggests that the incorporation of the indirect sources of economic exposure in these models explains more of the variation

in the exchange rate sensitivity of sales volumes than can be explained by financial ratios alone. A similar result was obtained with respect to the models analysing the determinants of profit margin sensitivity (M2 and M3). In both of these models, the pseudo  $R^2$  is greater than 30%.

It is possible that some degree of collinearity exists between the explanatory variables in the models. There is some debate in the literature as to how collinearity should be detected in ordered logit modelling. Menard (1995) points out that where significant collinearity exists in a logit model, the standard errors for the regression coefficients will tend to be large. A further common symptom is that the coefficients appear to be unreasonably high (i.e. considerably greater than two). Based on these rules of thumb, collinearity does not appear to be a significant problem in the ordered logit models shown in Tables 6.6 and 6.7. Moreover, the coefficients generally have signs which are consistent with expectations.

Tables 6.9 and 6.10 present the results of the predictive ability for each of six the logit models. These tables compare the actual exchange rate sensitivity ratings estimated by the responding finance directors on their questionnaires with those predicted by the models. The results show that the exchange rate sensitivity ratings for fewer than half of the companies are correctly predicted in all but one of the ordered logit models. These results also reveal that the predictive accuracy of all six models is highest with respect to the exchange rate sensitivity rating of '1'. For example, in model V1, 84 per cent of the companies with a sensitivity rating of '1' are correctly predicted, compared to 46 per cent of all companies. In contrast, the models misclassify all of the companies that report an exchange rate sensitivity rating of '5' (i.e. highly *sensitive*). This means that the models are most effective at predicting when a company is highly insensitive to changes in foreign exchange rates.

Why are these models apparently unable to predict those companies with revenue cash flows that are highly sensitive to exchange rate movements? There are two

possible reasons. The first is that there are other, more important determinants of economic exposure that have not been incorporated in the logit models. The second and more likely explanation is that most of the companies that have low levels of economic exposure share a common characteristic: they do not source or sell in foreign markets. In contrast, those firms that have cash flows which are highly sensitive to changes in foreign exchange rates are not a homogenous group. In addition to selling or sourcing in foreign markets, their economic exposure could be caused by any number of indirect factors, including a low level of product differentiation, or because a large proportion of their competitors are from foreign countries. In order to explore this issue further, the sources of economic exposure for six of the companies were examined more closely in the follow-up interviews which are discussed in Chapter 8.

**Table 6.9: The predictive accuracy of the logit models - sales volumes**

<b>Model V1</b>						
<b>Predicted Ratings</b>						
<b>Actual Ratings</b>	1	2	3	4	5	<b>% correct</b>
1	89	3	14	-	-	84
2	44	4	23	1	-	5
3	24	7	32	1	-	50
4	9	1	15	-	-	0
5	4	-	2	-	-	0
<b>% overall correct</b>						<b>46</b>

<b>Model V2</b>						
<b>Predicted Ratings</b>						
<b>Actual Ratings</b>	1	2	3	4	5	<b>% correct</b>
1	75	2	14	-	-	82
2	36	9	22	-	-	13
3	16	11	36	1	-	50
4	2	4	18	-	-	0
5	2	1	3	-	-	0
<b>% overall correct</b>						<b>48</b>

<b>Model V3</b>						
<b>Predicted Ratings</b>						
<b>Actual Ratings</b>	1	2	3	4	5	<b>% correct</b>
1	67	13	11	-	-	74
2	30	14	22	-	1	21
3	7	9	47	1	-	73
4	1	5	18	-	-	0
5	1	1	3	1	-	0
<b>% overall correct</b>						<b>50</b>



**Table 6.10: The predictive accuracy of the logit models - profit margins**

<b>Model M1</b>						
<b>Predicted Ratings</b>						
<b>Actual Ratings</b>	1	2	3	4	5	<b>% correct</b>
1	56	7	9	2	-	76
2	37	8	22	2	-	12
3	24	7	22	14	1	32
4	4	6	22	12	1	27
5	2	1	11	4	-	0
<b>% overall correct</b>						<b>36</b>

<b>Model M2</b>						
<b>Predicted Ratings</b>						
<b>Actual Ratings</b>	1	2	3	4	5	<b>% correct</b>
1	48	8	7	2	-	74
2	36	10	21	2	-	16
3	9	16	25	15	-	38
4	2	6	20	15	1	34
5	1	2	8	5	-	0
<b>% overall correct</b>						<b>39</b>

<b>Model M3</b>						
<b>Predicted Ratings</b>						
<b>Actual Ratings</b>	1	2	3	4	5	<b>% correct</b>
1	43	13	9	-	-	66
2	27	12	19	5	-	19
3	5	16	30	14	-	46
4	1	4	22	17	-	39
5	1	2	10	3	-	0
<b>% overall correct</b>						<b>40</b>

## 6.5 Summary and Conclusions

The purpose of this chapter was to investigate the determinants of economic currency exposure. This study has extended the contributions made by previous researchers in this area in two ways. Firstly, in addition to examining the direct sources of economic exposure, a number of indirect sources of foreign exchange rate sensitivity were also investigated. Secondly, this study also considered the effects of interactions between the explanatory variables in the determination of a company's economic exposure.

The empirical findings of this chapter are summarised in Table 6.11. This shows the hypothesised relationships between each of the 11 explanatory variables and the foreign exchange rate sensitivity of the cash flows of the sample companies ('+' indicates a positive relationship and '-' indicates a negative relationship). This table also summarises the results of the statistical tests used to measure the relationships. Where a statistically significant relationship between an explanatory variable and the foreign exchange rate sensitivity ratings is found to exist, this is indicated by either 'V' (for sales volumes), 'M' (for profit margins) or 'C' (for costs).

Table 6.11 shows that all four of the direct sources of exposure were found to be positively related to the foreign exchange rate sensitivity ratings. This provides support for previous research conducted by Jorion (1990) and Choi & Prasad (1995) which reports a positive association between the magnitude of a company's foreign operations and its economic currency exposure. The results suggest that of the indirect sources of economic exposure, the extent to which a company competes with foreign-based firms is the most important. The price sensitivity of demand for a company's products is also shown to be significant in determining the extent to which its sales volumes are sensitive to changes in foreign exchange rates. Of the interaction terms, only the interaction between the extent to which a firm sells in foreign markets and the extent to which it sources in foreign markets was found to be significant. Nevertheless, the coefficients on the remaining terms were negative,

which provides some support for the argument that firms may reduce their overall economic currency exposure by constructing natural hedges.

**Table 6.11: The determinants of economic exposure: A summary of the findings**

<b>Hypothesis #</b>	<b>Variable Name<sup>35</sup></b> (hypothesised relationship)	<b>Gamma Tests</b>	<b>Logit Modelling<sup>36</sup></b> (Models M3 & V3)
1	<i>Fsales</i> (+)	V(+), M(+), C(+)	V(+), M(+)
2	<i>Finputs</i> (+)	V(+), M(+), C(+)	M(+)
3	<i>Fproduction</i> (+)	V(+), M(+), C(+)	-
4	<i>Fdebt</i> (+)	V(+), M(+), C(+)	V (+)
5	<i>Fsales*Finputs</i> (-)	n/a	M (-)
6	<i>Fsales*Fproduction</i> (-)	n/a	-
7	<i>Fsales*Fdebt</i> (-)	n/a	-
8	<i>Fcompetition</i> (+)	V(+), M(+), C(+)	M (+)
9	<i>Costcompetitors</i> (-)	-	-
10	<i>Sensitivity</i> (+)	V (+)	V (+)
11	<i>Differentiation</i> (-)	V(+), M(+), C(+)	-

V = Sales Volumes, M = Profit Margins, C = Costs

In general, the ability of the ordered logit models to correctly predict the exchange rate sensitivity ratings of the sample firms is poor. The best model predicts only half of the ratings of the sample firms correctly. While the models are able to predict companies with revenue cash flows that are highly *insensitive* to exchange rate movements, they are unable to identify those companies with high levels of economic

<sup>35</sup> See Table 6.8 for a detailed description of each of the explanatory variables.

<sup>36</sup> The determinants of the exchange rate sensitivity of costs were not investigated using the ordered logit modelling technique.

exposure. This is probably because those companies with cash flows that are highly sensitive to changes in foreign exchange rates are heterogeneous. The determinants of their economic exposure are highly company-specific and it is therefore difficult to generalise for the group as a whole. The anecdotal evidence obtained from the additional comments made by the survey respondents about the indirect sources of their companies' economic exposure provides some support for this explanation.

## **CHAPTER SEVEN**

### **The Management of Economic Exposure: Survey Evidence**

#### **7.1 Introduction**

It is now widely accepted that economic currency exposure can be managed most appropriately by making adjustments in the operating policies of the firm, e.g. production, marketing and purchasing. This chapter presents survey evidence regarding the extent to which UK companies manage their currency exposure using operational means. In addition, the characteristics of the firms which report using operational hedging techniques are examined in order to explain why some companies are able to make greater use of them than others.

A further aspect of foreign exchange risk management that is investigated in this chapter relates to the currency in which foreign sales are invoiced. UK exporters face a choice between invoicing in sterling, the domestic currency of their foreign customers, or an alternative currency such as ECU or US dollars. As discussed in Chapter 3, previous empirical evidence has suggested that UK exporters have a tendency to invoice in sterling. The results presented in this chapter suggest that this pricing policy does not insulate such companies from economic currency exposure.

The layout of this chapter is as follows. The following section presents the findings of the 1996 survey with respect to the extent to which UK companies employ operational hedging techniques. Section 7.3 examines the factors which determine the extent to which companies use operational hedges. Section 7.4 addresses a number of other issues, including the extent to which UK companies invoice their exports in sterling. In the final section, the results presented in this chapter are summarised.

## 7.2 Methods of Managing Economic Exposure

In the main survey, the respondents were asked whether or not they attempted to manage the economic exposure of their company (a working definition of economic exposure was provided). Of the respondents, 43 per cent stated that economic exposure was managed in their company, while 55 per cent indicated that their company did not manage this form of currency exposure (the remaining 2 per cent failed to answer the question). There exists little previous UK research which can be compared to these findings. In their semi-structured interviews with the senior financial managers of 17 UK multinational corporations, Belk and Glaum (1990) found that economic exposure was not managed in a third of the companies. More recently, in a survey of 1000 of the Fortune 5000 multinational corporations, Price Waterhouse (1995) found that 52 per cent of the respondents reported that economic exposure was fully or partially hedged by their companies. The findings of this survey therefore appear to be broadly consistent with those of previous empirical research.

### 7.2.1 The extent to which operating hedges are used

The main survey also asked the responding finance directors to indicate the extent to which nine different operational hedging techniques were used in their companies *primarily* for the management of exchange rate risk. The responses obtained to this question are shown in Table 7.1. These results show that only two of these techniques are employed by more than half of the respondents - those of obtaining foreign currency denominated debt and matching costs with revenues denominated in the same currencies. These results are similar to those reported by Edelshain (1995) who found that approximately half of the respondents to his survey reported using these techniques. A possible reason for the popularity of foreign currency denominated debt is the flexibility it offers, given the existence of currency swaps. Furthermore, debt policy is usually the responsibility of the finance department who are likely to be most involved in the management of currency risk.

**Table 7.1: The use of operational hedging techniques**

Strategy	Percentage Responding (N = 289)		
	Often	Occasionally	Never
1. Foreign currency denominated debt	39 %	26 %	35 %
2. Sourcing inputs in the same currencies as sales are made	31	38	31
3. Differentiating the company's product/s to avoid direct price competition with foreign competitors	23	23	54
4. Locating production in the same countries as sales are made	22	17	61
5. Diversifying sales in many different currencies	19	18	63
6. Sourcing inputs in the same currencies as major competitors	15	21	64
7. Locating production/operations in the same countries as major competitors	8	14	78
8. Altering the country from which inputs are sourced following movements in foreign exchange rates	4	35	61
9. Altering the country in which production occurs following movements in exchange rates	1	15	84

By differentiating its products from those produced by its competitors, a company can reduce the sensitivity of its sales volumes to exchange rate induced price fluctuations. A surprising 46 per cent of the survey respondents reported using this technique often or occasionally for the primary purpose of managing currency risk.



Another popular strategy among the survey respondents was the location of production in the same countries as sales are made - 39 per cent reported using this technique as a means of managing currency risk. Edelshain (1995) found that a considerably lower proportion of his survey respondents used these techniques. Approximately 10 per cent of his sample located production in selling markets, while only one (out of approximately 120 survey respondents) reported using a product differentiation strategy to manage currency risk.

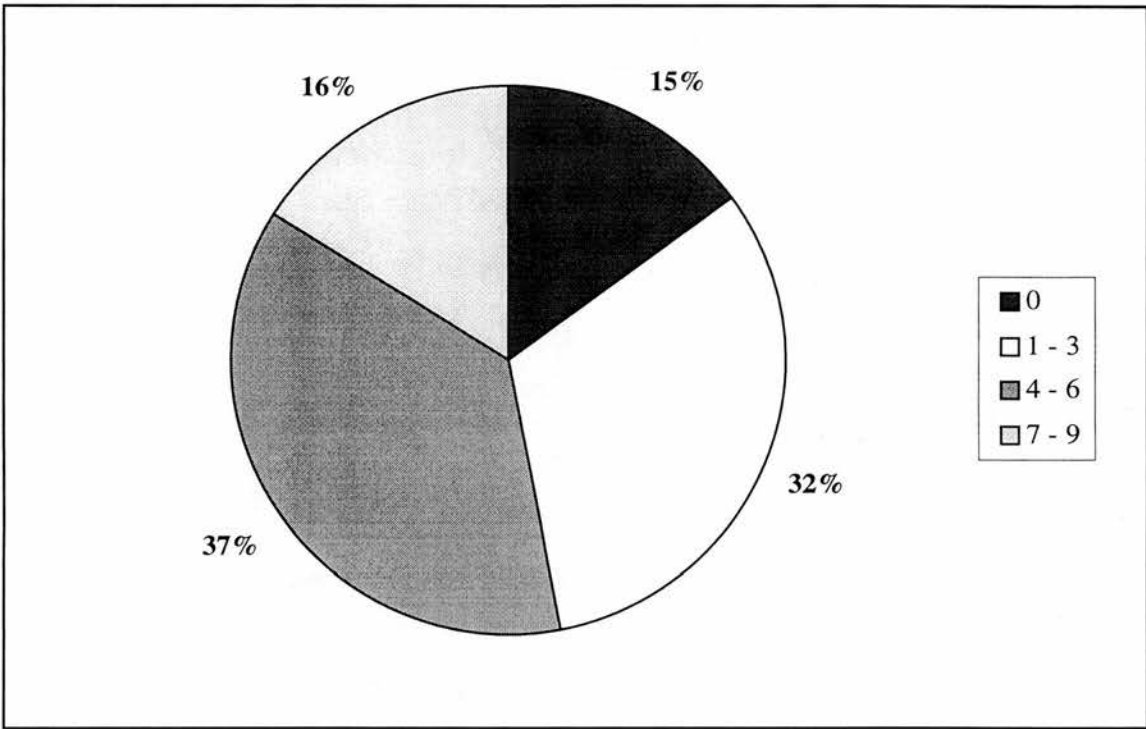
The production and purchasing strategies of competitors are considered by a number of the survey respondents when managing currency exposure. By adopting similar strategies to those of its competitors, a company may limit the impact of exchange rates on its cash flows, because its competitors are affected in the same way. Of the respondents, 36 per cent reported sourcing inputs in the same currencies as competitors, while 22 per cent reported locating production in the same countries as their competitors in order to manage foreign exchange exposure.

The respondents appear generally reluctant to alter the locations of their production facilities or the markets in which they purchase their inputs in response to movements in foreign exchange rates. Approximately one third of the respondents, however, indicated that their purchasing policies were *occasionally* altered to manage currency exposure. These responses are similar to those reported by Edelshain (1995), who found that very few of his responding companies were willing to move sourcing to weak currencies or away from strong currencies. In contrast, Davidson (1996) reports that many Japanese companies have managed the economic currency exposure arising from the long term strength of the Yen by moving production offshore.

The number of operational hedging techniques used by the responding companies is summarised in Figure 7.1. This shows that only 15 per cent of the respondents do not employ any of the operating hedges listed in the questionnaire. Approximately one third of the finance directors reported that their companies employ up to three of

the hedging techniques, while a similar proportion indicated that between four and six of the operating hedges are used in their firms. These results suggest that the foreign exchange risk management methods of British non-financial companies are becoming increasingly sophisticated, as detected by Soenen and Aggarwal (1989).

**Figure 7.1: Number of operational hedging techniques used**  
(N = 298)



The survey respondents were asked to indicate whether any other operational hedging techniques were used by their company. One respondent, from a company in the electronics industry, stated that his company used the strategy of reducing product costs, presumably when sterling appreciation puts pressure on the company's profit margins in export markets. This strategy has been popular among Japanese companies who have attempted to maintain profit margins in the face of the strengthening Yen by cutting fixed costs (Davidson, 1996). A number of respondents also indicated that their company has a policy of invoicing in sterling in order to

avoid currency risk. The problems associated with such a strategy are discussed in section 7.4.

Other survey respondents indicated that they managed the currency exposure of their companies on the cost side by attempting to pass on the impact of exchange rate movements to their suppliers. For example, a respondent from the distribution sector commented that currency risk was managed in his company by forcing suppliers to accept currency risk. Another respondent, from the breweries industry, indicated that his company adopted a similar strategy, although he admitted that this method of managing currency exposure is only effective in the short term:

*“We use fixed price sterling contracts, though in the long term we are exposed on contract renewal.”*

Despite the focus of this survey question on operational means of managing currency exposure, many respondents took the opportunity to point out that their company used forward contracts and other financial instruments for foreign exchange risk management. The following quotation, from a finance director of a diversified industrial firm, is indicative of these comments:

*“We sell currency forward to protect sales receipts in foreign currencies against foreign exchange fluctuations.”*

Thirty survey respondents (approximately 10%) made similar comments regarding the use of financial instruments for the management of currency exposure. As explained in Chapter 3, while such a strategy may be useful for managing short term transaction exposure, financial hedging does not prevent the competitive position of the firm from being eroded (or strengthened) by currency movements in the long term.

7.2.2 Industry membership and the use of operating hedges

The relationship between industry membership and the use of operating hedges was investigated and the results are shown in Table 7.2. A chi-square test was performed of whether the proportions of respondents in each of the four categories are identical across industries. This necessitated the aggregation of the industries into the five sector groupings due to the unreliability of chi-square tests when a number of expected frequencies within cells are less than five. A chi-square statistic of 66.97 ( $p = .0000$ ) was obtained, which indicates that we can reject the null hypothesis of no industry differences in the number of operational hedging techniques used.

Table 7.2: The use of operating hedges across industries

Number of Techniques Used						
Industry	No. of Respondents	0	1 - 3	4 - 6	7 - 9	Average
All Companies	296	14 %	32 %	38 %	16 %	3.8
Utilities	15	40	40	20	0	1.9
Services	113	18	42	34	6	2.8
Consumer Goods	35	14	23	49	14	4.0
Industrials	119	8	20	43	29	4.9
Extractive Industries	14	14	58	14	14	3.4

These results show that companies in the general industrials sector are most likely to use a large number of different operational hedging techniques. Of the respondents from industrial companies, 72 per cent reported the use of four or more operational hedging techniques. A closer examination of these companies revealed that they were largely from the chemicals and engineering industries. Eight finance directors

of engineering firms indicated that they used all nine of the operational hedging techniques listed in the questionnaire. This represented 20 per cent of all respondents from engineering companies. The extensive use of operating hedges by engineering firms may be due to the significant operating flexibility many of them have. Moreover, the industry analysis conducted in Chapter 5 revealed that the costs and revenues of many engineering companies are highly sensitive to exchange rate movements, increasing the need for effective currency risk management programmes.

The results in Table 7.2 also reflect that those companies in the utilities, services and extractive industries use fewer operational hedging techniques than average. This may be due to the lower level of economic currency exposure faced by firms in these sectors. In addition, companies in these industries have little operating flexibility. For example, in the case of the extractive industries, the sourcing of inputs depends solely on the location of mineral deposits. For such companies the alteration of sourcing policies is therefore not a valid means of managing currency exposure. In the case of firms in the services and utilities sectors, the non-transportable nature of the products and services they produce limits their ability to alter the location of their purchasing and production.

### 7.3 Determinants of the Use of Operating Hedges

The survey results presented in Figure 7.1 show that the extent to which companies employ operational hedging techniques varies considerably. It has been suggested in the theoretical literature (for example Glaum, 1990), that there exist substantial barriers which limit the ability of companies to manage currency exposure using such techniques. A number of additional comments volunteered by the respondents to the survey suggest that considerations of foreign exchange risk may be secondary to other strategic considerations made by the operating departments of their companies. For example, one finance director from a company in the extractive industries commented:

*“Foreign exchange risk management for transactional exposure supports commercial management rather than leads.”*

A similar comment was made by the finance director of a car manufacturing company:

*“Many other factors influence business decisions besides movements in foreign exchange rates.”*

Another respondent, from a transport distribution company, explained that the management of currency exposure was not the primary consideration when deciding to establish foreign operations:

*“To the extent that we do serve a particular foreign market from within that market, it is because that is the only way we can operate, and not to hedge our currency exposures.”*

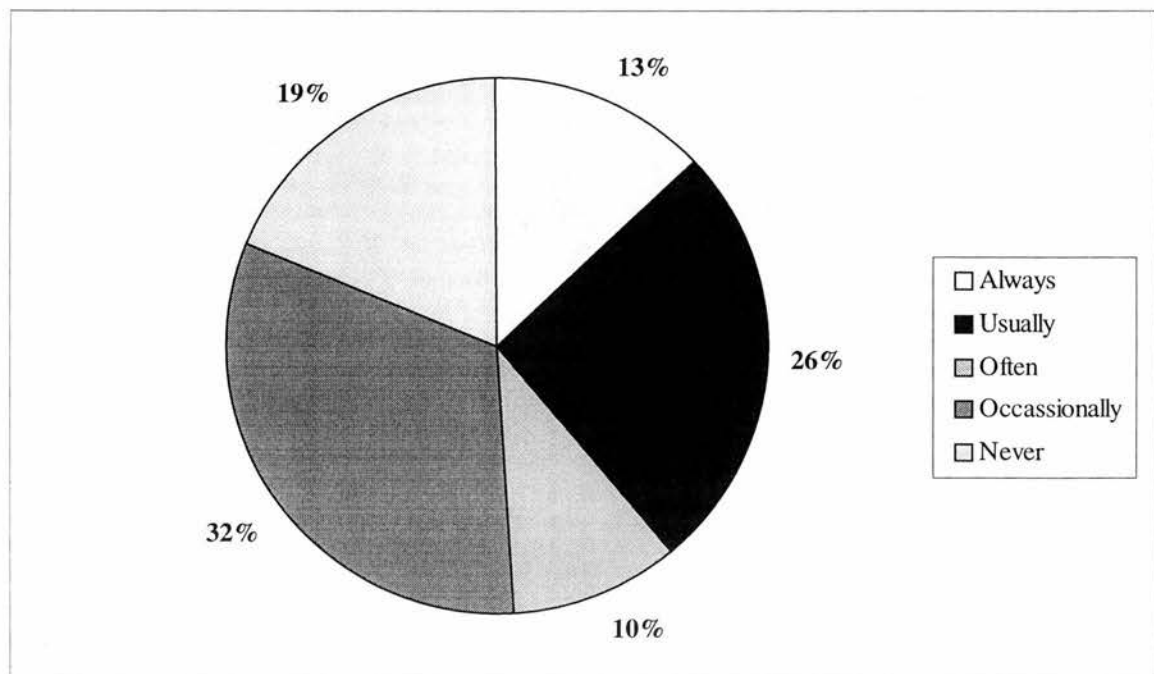
These additional comments suggest that for a number of companies, there are limitations associated with the use of operational hedging techniques. The

remainder of this section analyses two possible determinants of the use of operating hedges: the extent to which operating departments are involved in the management of currency exposure and the ownership of foreign subsidiaries.

### 7.3.1 The consideration of currency risk issues by operating departments

Edelshain (1995) suggests that a major reason why operating hedges are not widely adopted is that the management of currency exposure remains largely within the finance function of the firm. As a result, he maintains that the marketing, production and corporate planning divisions have little concern for foreign exchange exposure. In the main survey, respondents were asked to indicate to what extent the operating divisions of their company incorporated currency risk management considerations in their decision making processes. The results are reported in Figure 7.2.

**Figure 7.2: The incorporation of foreign exchange considerations in operational decision making**  
(N = 298)





These results show a wide diversity in the extent to which currency exposure considerations are made by operating departments. A large proportion of respondents (almost 40%) indicated that foreign exchange considerations are *always* or *usually* involved in the decisions made by the operating departments of their companies. Nevertheless, a significant proportion (19%) indicated such considerations were *never* made. An analysis of the latter group of respondents revealed that 90 per cent indicated earlier in the questionnaire that they considered the sales volumes, margins and costs of their company to be *highly insensitive* to exchange rate movements (i.e. a sensitivity rating of '1'). These findings are similar to those reported by Broder (1984) who found that foreign exchange considerations played an important role in the decisions made by the operating divisions of 40 per cent of the UK companies he surveyed.

The relationship between the extent to which firms employ operational hedging techniques and the incorporation of currency exposure considerations in the decision making processes of operating departments is analysed in Table 7.3.

**Table 7.3: The use of operating hedges and the consideration of currency risk management issues by operating departments**

$$\chi^2 = 94.91 \text{ (p = .0000)}$$

Incorporation of Currency Considerations	Number of Operational Hedging Techniques Used			
	0	1 - 3	4 - 6	7 - 9
<i>All Companies</i>	15 %	32 %	37 %	16 %
Always	5	33	46	16
Usually	1	27	44	28
Often	3	23	45	29
Occasionally	11	37	41	11
Never	50	36	10	4

The results presented in Table 7.3 show that half of the respondents who reported that the operating departments of their company *never* incorporate currency exposure considerations in their decision making do not use any operational hedging techniques. In contrast, those companies which report that currency risk considerations are incorporated in the decisions made by their operating divisions *always*, *usually* or *often* are much more likely to use a significant number of operational hedging techniques. Approximately 70 per cent of respondents in each of these categories indicated that their companies used four or more of the nine operational hedging techniques listed in the questionnaire.

A chi-square test was conducted, resulting in a chi-square statistic of 94.91 ( $p = .0000$ ). This indicates that the null hypothesis of no relationship between the number of operational hedging techniques used and the extent to which currency risk management considerations are incorporated in the decision making of operational departments can be rejected. This finding therefore provides support for Edelshain's hypothesis by showing that the use of operational hedging techniques is likely to be limited in those companies where foreign currency exposure is not considered by the non-financial departments.

### **7.3.2 The ownership of foreign subsidiaries**

Despite the relatively low cost of using operational hedges in the long run, the initial costs of altering operating strategies to manage exchange rate risk may be high for those companies which do not have significant foreign operations. Companies which own foreign subsidiaries have greater flexibility to adjust their production, financing and sourcing strategies to manage currency risk than their domestic based counterparts. Of the 298 responding companies, 87 do not have foreign subsidiaries. Table 7.4 compares the proportions of those companies with and without foreign

subsidiaries<sup>37</sup> using each of the operational hedging techniques investigated in the survey.

**Table 7.4: The ownership of foreign subsidiaries and operational hedging**

Hedging Technique	% of Companies Using Technique <sup>38</sup>	
	Companies with foreign subsidiaries (N = 202)	Companies without foreign subsidiaries (N = 87)
1. Foreign currency denominated debt	84 %	20 %
2. Sourcing inputs in the same currencies as sales are made	80	44
3. Differentiating the company's product/s to avoid direct price competition with foreign competitors	53	26
4. Locating production in the same countries as sales are made	50	12
5. Diversifying sales in many different currencies	46	14
6. Sourcing inputs in the same currencies as major competitors	42	21
7. Locating production/operations in the same countries as major competitors	27	9
8. Altering the country from which inputs are sourced following movements in foreign exchange rates	43	31
9. Altering the country in which production occurs following movements in exchange rates	16	8

<sup>37</sup> Information regarding the ownership of foreign subsidiaries for each company was obtained from the Extel Company Research Database.

<sup>38</sup> The percentage of companies using each technique is derived by adding together the percentage of respondents which responded that they 'often' or 'occasionally' use the technique.

The results presented in Table 7.4 show that for each of the operational hedging techniques, the proportion of users among those companies without foreign subsidiaries is, not surprisingly, lower than the proportion of users among those companies which do own foreign subsidiaries. Among the companies with no foreign subsidiaries, the three most widely adopted techniques are: sourcing of inputs in the same currencies as sales are made (used by 44% of such firms), altering the country from which inputs are sourced following movements in foreign exchange rates (31%), and differentiating the company's product/s to avoid direct price competition with foreign competitors (26%).

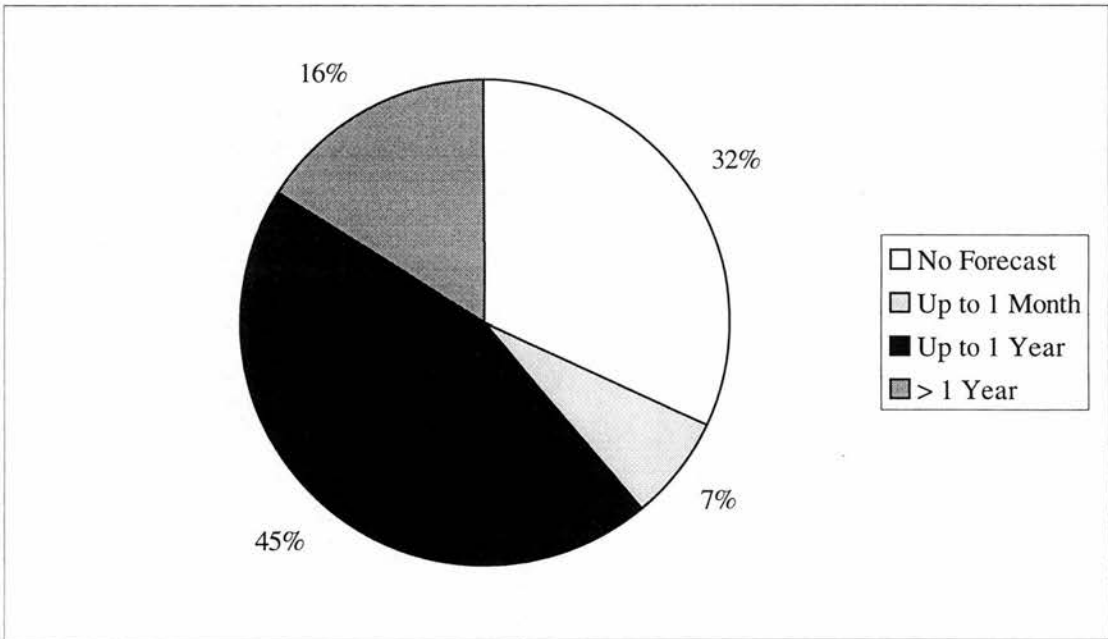
The use of foreign currency denominated debt is significantly lower for those companies without foreign subsidiaries (20% compared to 84% of the respondents which do own foreign subsidiaries). In addition, those operational hedging techniques involving the location of production facilities are not widely adopted by such companies. For example, the strategy of locating production in the same currency as sales are made is only used by 12 per cent of companies without foreign subsidiaries, compared to half of the other companies. These findings suggest that the use of a number of operational hedging techniques depends heavily on the ownership of foreign subsidiaries and the operating flexibility that this provides.

# 7.4 Other Issues

## 7.4.1 The forecasting of future foreign currency cash flows

It is widely accepted among academics that in order to manage long term economic exposure, it is necessary to forecast the future foreign currency cash flows of the firm. The survey respondents were asked to indicate whether or not such future cash flows were forecast in their company and if so, for which time horizons. The results are shown in Figure 7.3.

**Figure 7.3: The forecasting of future foreign currency cash flows**  
(N = 298)



The main finding emerging from the results shown in Figure 7.3 is that approximately one third of respondents do not forecast their foreign currency cash flows. Of these companies, 74 per cent indicated in a later section of the questionnaire that they have foreign sales of less than 20 per cent of total sales, while 80 per cent indicated that their foreign sourced inputs represent less than 20 per cent

of total inputs. It is clear, however, that there exists a number of companies with significant foreign purchases and sales (i.e. greater than 20%) in which future foreign currency cash flows are not forecast.

Almost half of the respondents indicated that foreign currency cash flows were forecast for periods of up to one year in their company. Such forecasts are only likely to be useful in the management of transaction exposure. To manage economic exposures effectively, it is necessary to forecast foreign currency cash flows beyond one year, which is done by only 16 per cent of respondents.

#### **7.4.2 The invoicing currency of exports**

In the main survey, three respondents volunteered additional comments which suggested that the main strategy used by their companies to manage foreign exchange risk was to invoice their foreign sales in sterling. The following comments were made by finance directors of companies in the building materials & merchants, paper packaging & printing and media industries respectively.

*“We often sell and invoice in sterling overseas, which minimises our exchange risk.”*

*“We sell in sterling wherever possible.”*

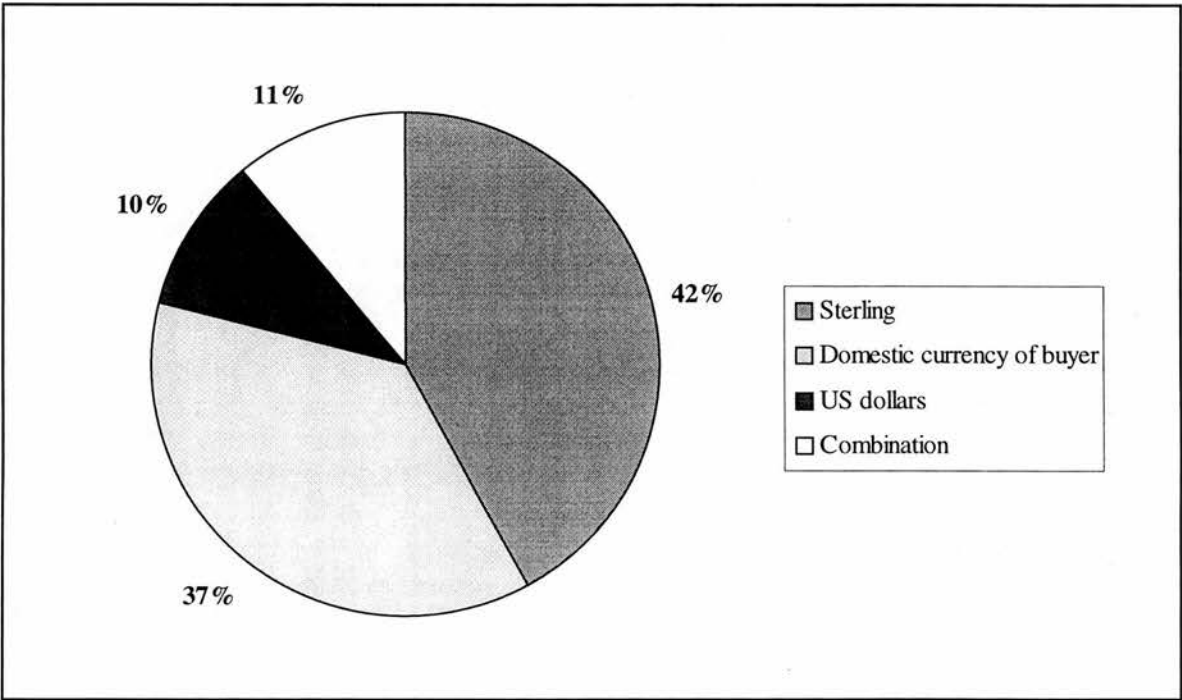
*“We quote any foreign services in a way which passes the exchange risk onto our customers.”*

The strategy illustrated by these quotations is myopic, as it assumes that by avoiding transacting in foreign currencies, exchange rate exposure can also be avoided. But invoicing in sterling merely shifts the foreign exchange risk onto the customers of the firm, who may adjust their quantity demanded accordingly. In addition, if

competitors are invoicing in a different currency, an appreciation in the domestic currency may lead to a loss in market share.

In order to examine the invoicing practices of British exporters further, the follow-up survey, distributed in 1997, asked the respondents to indicate in which currencies they invoiced their foreign sales. The results are shown in Figure 7.4.

**Figure 7.4: Invoicing currency of exports**  
(N = 130)



The results in Figure 7.4 show that a substantial proportion (42%) of the 130 exporting respondents invoice their foreign sales in sterling. This proportion is, however, significantly lower than those reported by other researchers. For example, a series of seven surveys conducted by the Department of Trade and Industry in the late 1970s showed that on average, 75 per cent of UK exports were invoiced in sterling (see Table 3.2). The difference between the findings of this study and those of the DTI surveys may be explained in terms of the size of the surveyed companies. When the DTI compared the invoicing practices of large and small exporters, they



found that small exporters (those with exports worth less than £25m in 1975) had a greater propensity to invoice their foreign sales in sterling. Among the large exporters investigated in these surveys, approximately 60 per cent invoiced their exports in sterling. Because the current study focuses on exchange listed exporting companies, it is more appropriate to compare the findings with those associated with the large companies investigated in the DTI survey. Viewed in this light, the proportion of respondents who report invoicing their exports in sterling is only 18 per cent lower than that reported in the DTI surveys.

An additional comment, made by the finance director of an engineering firm, offers a possible explanation for the significant proportion of exporting survey respondents that invoice in foreign currency.

*"Because of regular sterling devaluation over many years it has tended to be better for companies to invoice in foreign currency since more sterling is received. Also it is easier to sell currencies in the sophisticated UK money markets at better rates than the customer could buy sterling. Also, smaller overseas customers much prefer to avoid the hassle of buying foreign currency thus giving a UK exporter an advantage if he is prepared to invoice in local currency."*

In order to test whether invoicing in sterling insulates exporting firms from economic exposure, as suggested by the quotations from respondents presented earlier in this section, the relationship between the exchange rate sensitivity ratings given by the exporting companies in the 1997 survey and the currency of invoice was examined. Those companies which reported invoicing in a combination of sterling and foreign currency were removed from the sample. The exchange rate sensitivity ratings of the 52 companies invoicing in sterling were compared to the ratings of the 59 companies which reported invoicing in foreign currency (i.e. the domestic currency of the buyer or US dollars). The results for sales volumes are shown in Figure 7.5, while the results for profit margins are presented in 7.6.

Figure 7.5 shows that the exchange rate sensitivity ratings of sales volumes given by the exporting companies are remarkably similar for those companies invoicing foreign sales in sterling and those invoicing in foreign currency. In order to test for any differences, a chi-square test was conducted. A chi-square statistic of 2.25 ( $p = .522$ ) was obtained, which suggests that the null hypothesis of there being no difference between the two groups of exporters cannot be rejected.

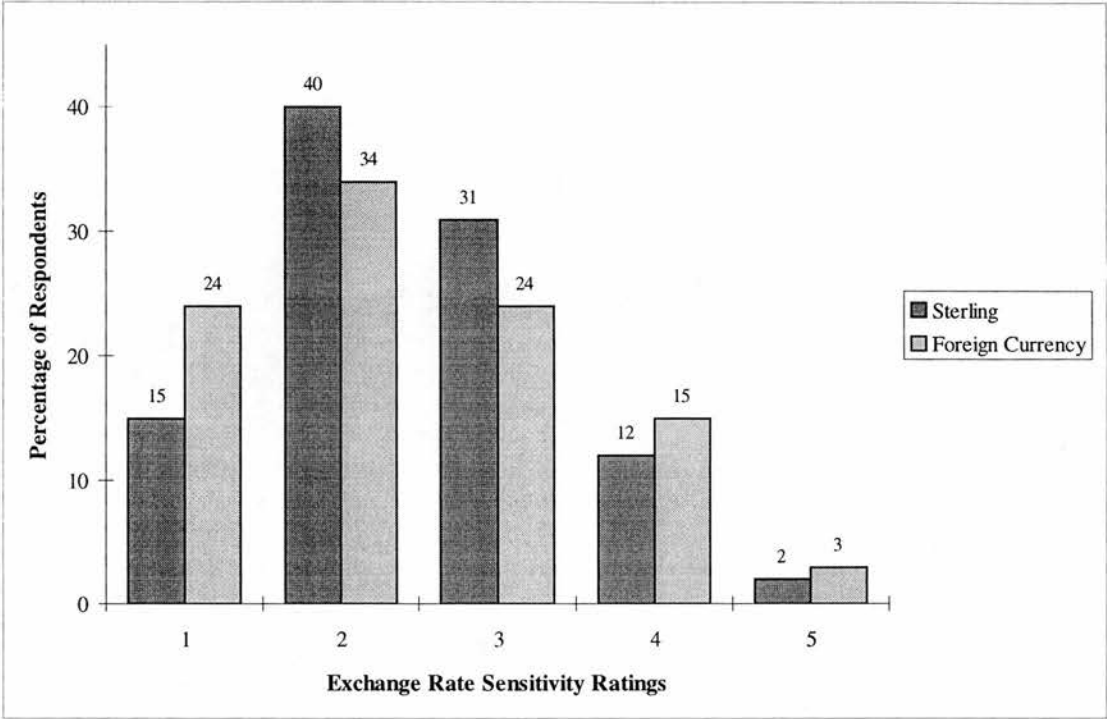
Similar findings were obtained with respect to the exchange rate sensitivity ratings of profit margins, shown in Figure 7.6. These results also reflect that the proportions of companies reporting each level of exchange rate sensitivity is very similar. A chi-square statistic of 2.74 ( $p = .433$ ) was obtained, which means that we cannot reject the null hypothesis of no difference between the two groups of exporters.

One significant difference between the two groups of companies is that 19 per cent of those exporters which reported invoicing in foreign currency gave an exchange rate sensitivity rating of profit margins of '5' (highly sensitive), while none of the companies which invoice their exports in sterling gave this rating. This is unsurprising, as following a change in exchange rates, those companies which invoice their sales in foreign currency need to make an adjustment in their foreign currency prices if they wish to maintain stable profit margins. In contrast, the profit margins of exporters which invoice in sterling are likely to be more stable because if a price adjustment is not made following a movement in exchange rates, the effect is absorbed by the foreign customer, and the profit margins of the exporter remain unchanged<sup>39</sup>.

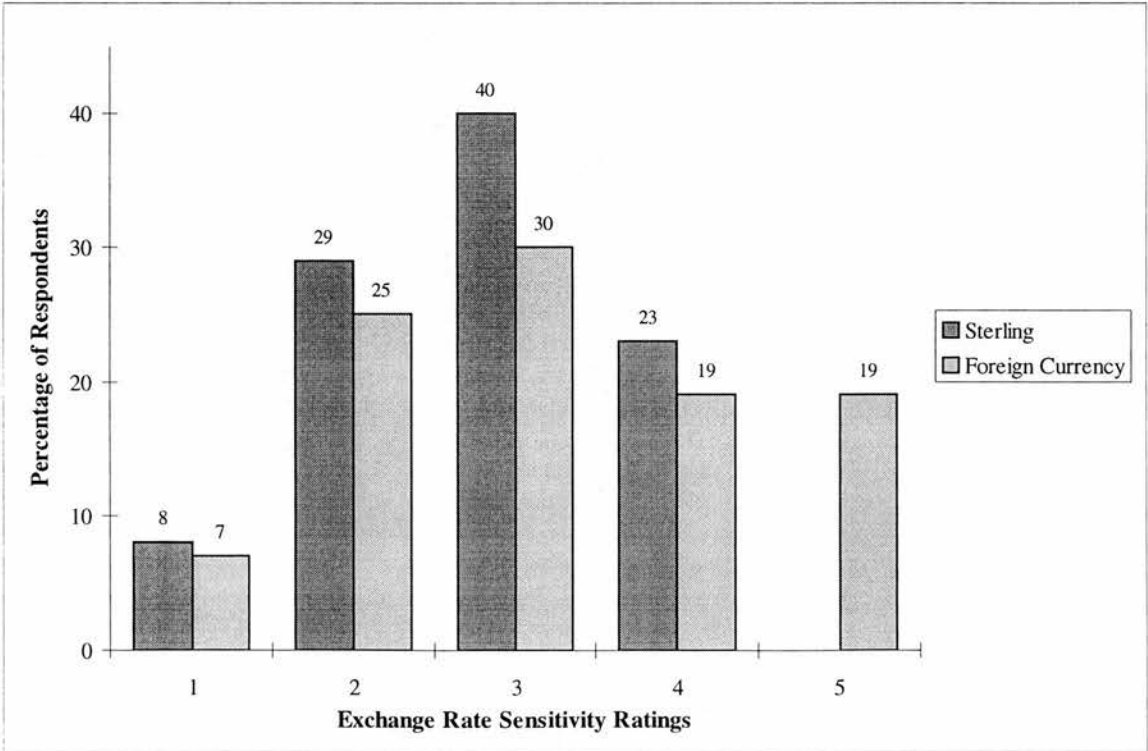
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<sup>39</sup> There may, of course, be a change in the foreign sales volumes of such exporters, depending on the price sensitivity of the foreign customers.

**Figure 7.5: Exchange rate sensitivity of sales volumes and currency of invoice**  
(N = 111)  $\chi^2 = 2.25$  (p = .522)



**Figure 7.6: Exchange rate sensitivity of profit margins and currency of invoice**  
(N = 111)  $\chi^2 = 2.74$  (p = .433)



The fact that the exchange rate sensitivity ratings of the two groups of the exporters are broadly similar suggests that the point of view expressed in the quotations presented earlier in this section are the exception, and that most of the survey respondents are aware that their revenue cash flows cannot be immunised from currency exposure simply by invoicing their foreign sales in sterling.

## 7.5 Summary and Conclusions

In general, the results presented in this chapter reflect that there exists a relatively high level of sophistication in the management of foreign exchange exposure by British firms. More than half of the survey respondents (which included a number of firms without significant foreign operations) reported using four or more of the nine different operational hedging techniques listed in the main questionnaire. Furthermore, the proportions of respondents using many of the individual operational hedging techniques are higher than those reported by previous empirical research and in particular, the survey conducted by Edelshain (1995). This suggests that British companies are now more willing to make adjustments in their operating strategies and policies in order to insulate their cash flows from the adverse effects of foreign exchange rate movements.

The survey respondents did, however, appear reluctant to alter the locations of their production facilities or the markets in which they purchase their inputs in response to changes in foreign exchange rates. Additional comments made by some respondents suggest that barriers exist which limit the extent to which currency exposure can be managed by making adjustments to production and sourcing strategies. It appears that many companies are constrained in their ability to make these adjustments solely for the purposes of foreign exchange risk management, due to the importance of other operational considerations. In particular, the results suggest that companies without foreign subsidiaries are less likely to employ operational hedging techniques than their multinational counterparts. Companies which own foreign subsidiaries have increased operating flexibility, and so are able to make adjustments in operating strategies in order to manage risk without incurring large costs.

The use of pricing policies to manage currency exposure was examined by the follow-up survey, distributed in 1997. A surprising finding of this survey is that approximately 40 per cent of the responding exporting firms indicated that they invoice their foreign sales exclusively in sterling. This is a lower proportion than that

reported by the Department of Trade and Industry surveys conducted in the late 1970s. The survey results also suggest that the majority of the survey respondents are aware that invoicing in sterling does not protect their firm from the adverse effects of foreign exchange rate movements.

## **CHAPTER EIGHT**

### **The Currency Exposures of Six UK Companies: Interview Evidence**

#### **8.1 Introduction**

This chapter presents the qualitative evidence obtained from the semi-structured interviews that were conducted with six of the postal survey respondents in October and November 1997. The interview findings add to the empirical evidence which has already been presented in this thesis by providing a more detailed account of the economic exposure faced by the six sample firms. By probing into the survey data, we are able to obtain a number of important insights into the sources of the exchange rate sensitivity of these firms, although the findings cannot be regarded as representative of the survey population. The interview evidence also helps to explain why many companies are not able to adopt flexible sourcing or production strategies in order to reduce their currency exposure, as proposed in the theoretical literature.

The six financial executives selected for interviews had responded to both of the postal surveys distributed earlier and had indicated that they would be willing to supply further information<sup>40</sup>. Table 8.1 shows the title of the interviewee, the industry membership, and the foreign to total sales ratio for each of the sample companies. Each firm was given a fictitious name for confidentiality purposes. This profile of the companies shows that the sample firms are relatively heterogeneous with respect to their industry membership. All of the companies sell at least some of their products in foreign markets, although the proportions range from five per cent of total turnover to 85 per cent.

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<sup>40</sup> The transcriptions of the interviews are presented in Appendix B.



**Table 8.1: A profile of the firms selected for interview**

<b>Company Name</b>	<b>Title of Interviewee</b>	<b>Industry Membership</b>	<b>Foreign Sales as % of Total Turnover</b>
Industrial Steel	Director of Financial Services	Engineering	57%
Edible Oils	Finance Director	Food producers	5%
UK Energy	Group Treasury Manager	Oil Exploration & Production	47%
London Leisurewear	Group Treasury Manager	Textiles & Apparel	42%
Scottish Woollens	Group Treasury Manager	Textiles & Apparel	70%
Speciality Chemicals	Chief Economist	Chemicals	86%

## **8.2 The Economic Exposure of the Individual Firms**

In this section, the interview evidence is used to analyse the economic currency exposure of each of the sample firms. The companies are categorised using the framework proposed by Flood & Lessard (1986), which classifies firms according to the responsiveness of their cost and revenue cash flows to movements in foreign exchange rates. The four categories are summarised in Table 8.2. The analysis of each firm incorporates the competitive sources of economic exposure, in addition to the direct sources arising from its foreign sourcing and selling activities. The interviewees were asked questions concerning how the prices of their inputs and outputs are determined, who their main competitors are, and the sensitivity of their customers to changes in price. By considering the characteristics of the sample companies, we are also able to determine the factors which constrain their ability to reduce their foreign currency exposure via operational means.

**Table 8.2: Flood and Lessard's classification of economic exposure<sup>41</sup>**

<b>Category Name</b>	<b>Company Types</b>
<b>Local Market Firms</b>	<i>Those firms that source their inputs and sell their products in their domestic markets only.</i>
<b>Exporter Firms</b>	<i>Those firms that sell their products in competitive world markets, but source their inputs in their domestic markets.</i>  <i>Those firms that source their inputs and sell their products in their domestic markets only, but face significant competition from foreign imports.</i>
<b>Importer Firms</b>	<i>Those firms that source their inputs in competitive world markets, but sell their products in their domestic markets only.</i>
<b>World Market Firms</b>	<i>Those firms that source their inputs and sell their products in competitive world markets.</i>  <i>Those firms that source their inputs in foreign markets, but face competition from companies with similar currency exposures.</i>

**8.2.1 Industrial Steel plc**

Industrial Steel produces a full range of steel products which are the raw materials for the manufacturing industry. In addition, the company sells its products to wholesalers that sell onwards to smaller manufacturers. The company's sales revenues are extremely sensitive to changes in foreign exchange rates for three reasons. The first is that a high proportion of Industrial Steel's output is exported to highly competitive world markets. Of the 70 per cent of the company's production which takes place in the UK, approximately half is exported to foreign customers.

<sup>41</sup> Adapted from Flood & Lessard (1986)

The world market for steel is highly fragmented and competitive. Industrial Steel is the third largest steel company in the world by output, and yet it only has a world market share of two per cent. This company is therefore a price taker and so it has little ability to pass on the effects of changes in exchange rates to its foreign customers.

The second reason why Industrial Steel's sales revenues are highly sensitive to changes in foreign exchange rates is the substantial competition from foreign imports the company faces in its domestic market. The recent appreciation in sterling has enabled the company's foreign competitors, particularly those based in Germany, to discount their steel prices in the UK market. As a result of the price sensitivity of Industrial Steel's customers, these price reductions have provided the foreign firms with a significant competitive advantage in the UK. The third source of the exchange rate sensitivity of Industrial Steel's sales revenues arises out of the impact of currency movements on some of the firm's UK customers. As explained by the Finance Director, many of Industrial Steel's customers are themselves heavily dependent on export sales:

*"Most of our customers export a high proportion of their output and so if they are not able to export their products, then they will demand less steel from us."*

The input costs of Industrial Steel are less sensitive to changes in foreign exchange rates than its sales revenues. Although all of the raw materials used by the company (such as iron ore and coal) are imported and priced in US dollars, they represent only 25 per cent of Industrial Steel's total costs. The Finance Director explained that as approximately 20 per cent of his company's sales revenues are also denominated in US dollars, a natural hedge is achieved. For example, any advantage gained from an a decrease in the company's raw material costs as a result of an appreciation in sterling relative to the US dollar is offset by a reduction in the sterling equivalent of the company's dollar denominated revenues. Based on the interview, Industrial Steel therefore has the economic exposure profile of an *exporter* firm, that is, relatively

low input price sensitivity and high output price sensitivity to exchange rate movements.

This company's approach to the management of its economic currency exposure is not particularly sophisticated. With the exception of foreign currency denominated debt, Industrial Steel is not able to employ operational hedging techniques. The raw materials imported by the company are denominated in US dollars irrespective of the country in which they are purchased. The company is therefore unable to mitigate the exchange rate sensitivity of its costs by adopting a flexible sourcing policy. Industrial Steel's ability to adopt a flexible approach to the geographical location of its production is also limited due to the capital intensiveness of the steel-making process. The significant scale economies achieved by the company require that its production be highly centralised in a few locations. The Finance Director of Industrial Steel explained his company's position as follows:

*"Even if we did have significant foreign operations, because of our cost structure, which requires plants to be operated at high levels of utilisation, there would be a disadvantage if we were to under-utilise any of our facilities."*

He added that he was aware of companies which were able to manage their economic exposure to a certain extent using a flexible production strategy:

*"Some of our customers are able to operate that sort of policy. We have a particular customer that manufactures oil drums and has manufacturing facilities in the UK and also on the Continent. When the pound is strong as it is now, they stop producing in the UK and produce their drums in Rotterdam."*

As a result of Industrial Steel's low level of operating flexibility, the company relies heavily on financial hedging and in particular, forward foreign currency contracts for the management of its currency exposure. However, the company's financial hedging activities are limited to its *contracted* future cash flows. As its cash flows are typically contracted for up to six months in advance, the profitability of Industrial

Steel is only protected from unexpected foreign exchange rate movements over a very limited time horizon.

### **8.2.2 Edible Oils plc**

The product range produced by Edible Oils consists of edible oils and fats for the industrial market and also edible oils and margarines for retailers. Although only 5 per cent of this company's sales are generated in foreign markets, its sales revenues are extremely sensitive to changes in foreign exchange rates. This is because Edible Oils faces a significant indirect source of currency exposure in its domestic sales market due to import penetration. This refers to the ability of foreign importers to reduce their selling prices in the UK following an appreciation in the value of sterling. While foreign imports represent only a very small proportion of the UK market for edible oils and fats, importers often have a large impact, particularly those selling at marginal cost. This problem is intensified by the fact that the demand for the products made by the company is extremely sensitive to changes in price.

Edible Oils' input cash flows are also sensitive to changes in foreign exchange rates. The company's raw materials are sourced entirely within foreign markets and the prices for these inputs, many of which are denominated in US dollars, are established on a world market basis. These inputs include fish, palm, and rape seed oils and they account for approximately half of the production costs of the company. The Finance Director of Edible Oils pointed out that his company has little to gain from a reduction in the costs of its foreign sourced raw materials arising from an appreciation in sterling. This is because most of the firm's UK-based competitors are affected in a similar way. He explained his company's situation as follows:

*"Because all of our competitors also source their raw materials in US dollars, we are on a level pegging and therefore there is no competitive advantage."*

At first glance, it would appear that Edible Oils has the economic currency exposure profile of an *importer* firm. This is because a high proportion of its costs are denominated in foreign currencies, while only five per cent of its sales revenues are generated in foreign markets. However, due to the considerable import penetration in the UK market for Edible Oils' products, its domestic sales revenues are highly sensitive to changes in foreign exchange rates. The Finance Director considers this effect of foreign exchange rate movements to be more significant than their impact on his company's costs. Edible Oils therefore has the profile of an *exporter* firm, which highlights the subtlety of the effects of economic currency exposure.

The operating flexibility of Edible Oils is limited due to the nature of the markets in which it sources its inputs. The raw materials used by the firm are priced in US dollars, irrespective of the country in which they are purchased. Edible Oils is therefore unable to reduce its currency exposure by changing the location in which it sources its raw materials. However, the company has increased the proportion of its packaging which is purchased from foreign suppliers, in order to take advantage of the 1996-1997 appreciation in sterling. The Finance Director of Edible Oils also mentioned that one of the reasons behind his company's decision to begin expanding its export markets was a desire to offset its foreign currency denominated costs with foreign currency sales.

### **8.2.3 UK Energy plc**

UK Energy is involved in the extraction and development of oil and gas for sale in an unrefined form and it is therefore an upstream energy company. The company's sales revenues are highly sensitive to movements in foreign exchange rates. Although 40 per cent of UK Energy's exploration and production activities take place in the UK, the company's oil is sold in competitive world markets, in which the US dollar denominated price is set on an international basis. The firm is therefore a price taker and faces significant commodity price risk in addition to foreign currency



exposure. In contrast to many of the other sample companies, UK Energy has no ability to make pricing adjustments in response to a movement in foreign exchange rates. As a result, the impact of changes in foreign exchange rates on the cash flows of this company is highly predictable, because it is not dependent on the pricing reactions of competitors.

A high proportion of UK Energy's costs are denominated in foreign currency. Foreign exploration and production activities account for 60 per cent of the firm's total operations. The costs associated with these activities include labour, equipment, materials, and those arising from the employment of foreign contractors. Based on the interview evidence, the economic exposure profile of UK Energy is that of a *world market* firm. This is because the prices for the inputs used by the company and the prices of the gas and oil sold by the company are both highly sensitive to foreign exchange rate movements.

Foreign currency denominated debt is the main tool used by UK Energy for the management of economic currency exposure. The company has attempted to offset the significant currency exposure associated with its cash inflows by denominating a high proportion of its debt in US dollars (67 per cent as at 31 December 1996). The company has therefore achieved a natural hedge, because a reduction in its revenues caused by an appreciation in the value of sterling is offset to a certain extent by a reduction in the sterling equivalent of its debt servicing costs. The Group Treasury Manager of UK Energy explained his company's strategy as follows:

*"One of the ways in which we match or manage the economic exposure of our assets is by borrowing in US dollars. Therefore, if the economic value of a foreign asset falls, so does the economic value of the liabilities associated with that asset. So matched currency funding is a way of managing long term economic exposure, to the extent that it actually makes sense to go out and borrow in US dollars."*

With the exception of employing foreign currency denominated debt, UK Energy is prevented from using operational hedging techniques due to the nature of its



business. The decision to enter into a particular oil development is based largely on factors such as the cost, the base commodity price, taxation issues and political risks. Not surprisingly, currency exposure is a less significant factor in deciding the locations in which the firm's oil exploration and production activities should take place.

#### **8.2.4 London Leisurewear plc**

London Leisurewear sells footwear and leisurewear (usually branded products) to retailers. This company is different from others in the sample in the sense that it does not own any production facilities. Instead, London Leisurewear sources its products from various footwear and apparel manufacturers. Around two-thirds of the products purchased by the company are sourced in Far Eastern countries and are denominated in US dollars. The company's costs are therefore highly sensitive to changes in the US dollar:sterling exchange rate.

London Leisurewear generates approximately 75 per cent of its sales revenues in the UK. The company's retail customers have a great deal of market power. The products are sold at what are known as 'price points' and consequently the prices for the products sold by the company are effectively fixed, and it is not possible to pass through the impact of shifts in the US dollar:sterling exchange rate to its customers. The interview evidence therefore shows that London Leisurewear has the profile of an *importer* firm, that is, a high level of input price sensitivity and a low level of output price sensitivity to changes in foreign exchange rates. The only proviso to this classification is that changes in foreign exchange rates may have some impact on the competitiveness of London Leisurewear in the UK market relative to foreign based firms. Although the prices which the foreign companies receive for their goods are effectively fixed (in sterling terms) due to the existence of price points, an appreciation in sterling will increase their profit margins (in foreign currency terms). This may allow a foreign-based firm to improve the *quality* of the products it sells to

retailers in the UK at given price points. However, this effect is not as significant as the import substitution problem faced by Edible Oils.

London Leisurewear relies primarily on financial instruments for the management of its currency exposure. Although the company potentially faces an infinite choice with respect to the suppliers from which it sources its products, it does not operate a flexible sourcing strategy for two reasons. The first is that the company values the long term, mutual relationships that it has with many of its suppliers. The Group Treasury Manager explained the importance of these relationships as follows:

*“For some products, there is a sort of mutual relationship between us and our suppliers. We know that they can produce a certain style of shoe on time and at the quality we want whenever we want, and they know that they’re going to get a constant source of orders.”*

The second reason the company does not operate a flexible sourcing strategy is that it faces a restricted choice because the majority of its Far Eastern suppliers invoice their products in US dollars. Although London Leisurewear also sources some of its footwear from European suppliers, these companies often have limited capacity and are unable to supply large orders at short notice.

#### **8.2.5 Speciality Chemicals plc**

In contrast to many of the other sample companies, the product range produced by Speciality Chemicals is extremely diverse and comprises man-made fibres, coatings, sealants and paints. Of the company’s total production, 40 per cent occurs in the UK, with the remaining production taking place in 29 foreign countries. The UK market is not considered to be very important, with only 15 per cent of group turnover arising from UK sales. More than half of the production from the UK is exported to foreign markets.

The currency exposures faced by Speciality Chemicals are quite complex. An example that illustrates this complexity is the currency exposure arising from the company's sale of tencel fibre in Japan. The fibre is manufactured by Speciality Chemicals in the US, but sales are priced in Yen. Following the recent depreciation of the Yen, the company experienced an immediate transaction effect because the sales revenues of the US subsidiary were reduced in US dollar terms. However, there was also a translation effect when the profits of the US subsidiary were remitted to the UK. As a result of the strength of sterling relative to the US dollar, the sterling equivalent of the repatriated profits was also reduced.

The economic currency exposure profile of Speciality Chemicals appears to be that of a *world market* firm because the prices for its inputs and outputs are highly sensitive to changes in foreign exchange rates. In reality, however, it is very difficult to generalise about the economic exposure of the company as a whole. In some of its divisions, the economic exposure faced by the company is similar to that of a purely *domestic* firm. In its coatings and sealants division for example, the company is the sole supplier of aerospace sealants to Boeing. Because Boeing must go through a five year accreditation process if it wishes to change its suppliers, its demand for the sealants produced by Speciality Chemicals is highly insensitive to changes in price. This gives the company an increased ability to pass-on any adverse effects of currency movements to Boeing, thus reducing the over-all exchange rate sensitivity of its cash flows.

In some of the group's other activities, such as the chemicals division, the economic exposure experienced by Speciality Chemicals is similar to that faced by an *exporting* firm. For example, one of the company's UK-based subsidiaries produces filter tips for cigarettes. A large proportion of this output is exported to Europe, for which the company receives US dollars. The market for filter tips (and a number of other products produced by the company's fibres and chemicals divisions) is highly fragmented and the company faces a significant number of foreign based competitors. Following the recent appreciation in sterling, the company was unable to alter the

foreign currency prices for its exported filter tips due to the highly price sensitive nature of the market. It was therefore forced to accept much lower margins in order to protect its market share.

Speciality Chemicals relies heavily on forward foreign currency contracts for the management of its currency exposure. The Chief Economist emphasised that although currency exposure was considered in the development of his company's marketing and production strategies, flexible production and sourcing policies are not widely used for the management of currency exposure. He explained the shortfall of these policies as follows:

*"You have far less flexibility than it would seem because you are more locked in than theory would suggest. Relationships with suppliers and customers are long term ..... Theoretically if you had spare capacity you could make production shifts, but it's much more rigid than it seems."*

Some of the company's production facilities are located in the same countries where its products are sold. The Chief Economist emphasised that this is largely due to competitive considerations rather than a desire to obtain a natural hedge from foreign exchange rate movements.

#### **8.2.6 Scottish Woollens plc**

Scottish Woollens produces knitwear and clothing and also natural fibres and yarns. The company's main operations are based in the UK, but it also owns a US subsidiary which produces thermal apparel and accounts for approximately one third of the group turnover. The company's sales revenues are highly sensitive to changes in foreign exchange rates because on average, 60 per cent of its UK production is exported to foreign markets. Some of the company's domestic sales revenues are also sensitive to changes in foreign exchange rates. The Group Treasury Manager

explained that the amount of cashmere apparel sold by the company to foreign tourists in the UK has fallen as a result of the recent appreciation in sterling.

Scottish Woollens' raw material costs are largely US dollar based. In the production of its cashmere apparel, dollar denominated raw material costs account for around 75 per cent of the total production costs. The costs of the company's subsidiaries which produce cashmere apparel are therefore highly sensitive to changes in exchange rates. The lambswool used in the production of the company's woollen apparel is sourced in Australasia and is denominated in either Australian or New Zealand dollars, both of which are highly correlated with the US dollar. However, the lambswool accounts for only one quarter of the total production costs of the company's woollen apparel subsidiaries. The total input cash flows of these subsidiaries are therefore relatively insensitive to foreign exchange rate movements.

Based on the interview, the cashmere apparel division of Scottish Woollens has the profile of a *world market* firm, because the prices of their inputs and outputs are both highly sensitive to changes in foreign exchange rates. On the other hand, the woollen apparel division of this company has the profile of an *exporter* firm, that is, low input price sensitivity and high output price sensitivity.

Scottish Woollens is able to make only limited adjustments to its sourcing policies in response to movements in foreign exchange rates. The Group Treasury Manager mentioned that his company has used the appreciation in sterling as an opportunity to source a new range of leisurewear in Hong Kong. This company, like Industrial Steel and Edible Oils, has little to gain by altering the country in which it sources its raw materials, because they are usually denominated in US dollars. Furthermore, the Group Treasury Manager emphasised that the large costs associated with setting up foreign production plants prevents Scottish Woollens from operating a flexible production policy.

Due to its limited operating flexibility, this company attempts to manage its economic exposure by using forward foreign currency contracts to hedge its *uncontracted* future cash flows. Prior to issuing its price lists in early January for the autumn season, the group's treasury department takes out forward cover for 75 per cent of the expected foreign currency revenues. This policy has given the firm some degree of protection from the recent appreciation in sterling, as the following quotation from the Group Treasury Manager illustrates:

*"Over the last six months we have probably been over optimistic on the sales which means in reality, we've not been 75 per cent, we've been 85 per cent which in a funny sense has been better from a currency point of view because we've been hedged at better rates. That's why in the last year and this year, currency has hurt us, but no where near as much as if we hadn't hedged."*

The interviewee did acknowledge, however, that his company's hedging policy can only provide short term relief from the economic effects of changes in foreign exchange rates.



## 8.3 Insights Gained From the Interviews

### 8.3.1 The nature of the economic exposure of the sample firms

The analysis presented in section 8.2 confirms that assessing a firm's economic exposure is a complicated task. For a given firm, the impact of a change in foreign exchange rates will depend not only on the location of its major sourcing and selling markets, but also on the competitive environment in which it operates. In Table 8.3, the economic currency exposure profiles of the sample firms developed using the interview evidence are compared to those based on the postal survey data. The exchange rate sensitivity ratings shown in this table were obtained from the 1996 and 1997 postal surveys. In the questionnaires the respondents were asked to rate the exchange rate sensitivity of their company's sales volumes, profit margins and costs on a 5-point scale ('1' being highly insensitive). Using these ratings, the companies are categorised into one of the four groups proposed by Flood & Lessard (1986).

Table 8.3 shows that the interview-based classifications for three of the sample companies are the same as those based on the survey data (i.e. Industrial Steel, UK Energy, and London Leisurewear). We are therefore able to conclude that the quantitative information collected in the postal survey is an accurate method of measuring the economic exposure for these firms. In contrast, the survey data misconstrues the nature of the economic exposure experienced by Edible Oils, Speciality Chemicals, and Scottish Woollens. In the case of Edible Oils, this is because the survey data fails to capture the importance of the indirect economic exposure arising from the competition the company faces from foreign imports in its domestic market.

The misinterpretation of the economic exposure faced by Speciality Chemicals is caused by the highly diversified nature of the company's operations. The interview analysis shows that the chemicals and aerospace divisions of Speciality Chemicals have very different economic currency exposure profiles. As the postal questionnaire



Table 8.3: The economic currency exposure profiles of the sample firms

Company Name	Exchange Rate Sensitivity Ratings <sup>42</sup>			Economic Exposure Profile Based on the Survey Data <sup>43</sup>	Economic Exposure Profile Based on the Interview Evidence
	Costs	Margins	Volumes		
<i>Industrial Steel</i>	2.5	5	5	Exporter	Exporter
<i>Edible Oils</i>	4	2	2	Importer	Exporter
<i>UK Energy</i>	5	5	5	World Market	World Market
<i>London Leisurewear</i>	4	2	2	Importer	Importer
<i>Scottish Woollens</i>	2.5	4	4	Exporter	Exporter (woollen apparel) World Market (cashmere apparel)
<i>Speciality Chemicals</i>	3	4	4	World Market	Domestic (aerospace sealants) Exporter (chemicals)

<sup>42</sup> A 5-point scale was used, '1' being highly insensitive.

Where a respondent estimated different sensitivity ratings in the 1996 and 1997 postal surveys, an average of the two ratings is presented.

<sup>43</sup> For the definitions of the four economic exposure profiles, refer to Table 8.2.

asked the respondents to rate the foreign exchange rate sensitivity of their companies as a whole, it was not able to capture this diversity. Similarly, the postal survey data suggests that Scottish Woollens has the currency exposure profile of an *exporter* firm. However, the interview evidence shows that while this classification is correct for the firm's woollen apparel subsidiaries, its cashmere apparel subsidiaries have the profile of a *world market* firm.

A key finding of the interviews is that the indirect sources of economic currency exposure can be highly significant in determining the magnitude of the sensitivity of a company's cash flows to changes in foreign exchange rates. Empirical support is provided for the competitive sources of currency exposure suggested by Lessard & Lightstone (1986), Pringle (1991), and Shapiro (1992). In particular, the following indirect determinants of economic exposure can be identified from the analysis of the interviewees' responses:

- Facing competition in the domestic market from foreign-based importers.
- Producing products which are essentially undifferentiated from those produced by competitors.
- Selling into foreign markets where prices are determined on a world markets basis.
- Competing with companies that have costs denominated in different currencies.
- The value chain effect arising out of the impact of foreign exchange rate movements on the company's customers.

There is also evidence to suggest that it may be possible for a company to obtain some degree of protection from changes in foreign exchange rates by establishing strong relationships with its customers. For example, the products sold by the aerospace sealants division of Speciality Chemicals are highly specialised. In order for the most important customer of this division to change its supplier of aerospace sealants, it is necessary to go through a lengthy accreditation process. This increases the ability of Speciality Chemicals to 'pass-through' some of the effects of changes in

foreign exchange rates to its customers. Other firms in the sample clearly do not benefit from reduced foreign currency exposure as a result of customer loyalty. This is because they sell commodity products in highly competitive world markets in which they are effectively price takers, for example UK Energy and Industrial Steel. The revenue cash flows of these firms are highly responsive to changes in foreign exchange rates because they have little or no ability to pass on the effects to their customers.

### **8.3.2 The use of flexible sourcing and production policies**

As explained in chapter 3, Srinivasulu (1981) and Shapiro (1992) propose that companies may mitigate their economic currency exposure by shifting production between plants located in different countries, or moving to alternative sources of inputs following a change in foreign exchange rates. The postal survey findings presented in chapter 7 show that the companies in the survey population are generally reluctant to employ such policies. Of the respondents, 84 per cent stated that the location of their company's production is never altered in response to a movement in foreign exchange rates, while 61 per cent stated that the market in which their company sources its inputs is never changed due to currency fluctuations. The evidence obtained from the interviews shows that although the sample companies are highly vulnerable to changes in foreign exchange rates, there are factors which limit their ability to employ operating flexibility in order to reduce their currency exposure.

The extent to which many of the sample companies are able to employ sourcing flexibility to manage their economic exposure is constrained by the nature of their input markets. This is because their inputs are denominated in a particular foreign currency irrespective of the country in which they are purchased. For example, the prices of the raw materials used by Edible Oils and Industrial Steel are denominated in US dollars and are established on a world market basis. For these companies,

adopting a flexible sourcing policy would have little impact on the sensitivity of their cash outflows to foreign exchange rate changes.

Other interviewees stressed the importance of the strong relationships which exist between their company and its suppliers. These firms would be unwilling to switch suppliers for purely foreign exchange risk management purposes. As explained in the previous section, if these companies were able to 'lock-in' their customers in a similar fashion, they could reduce the responsiveness of their revenues to currency fluctuations.

Many of the sample companies are also unable to employ a flexible production strategy in order to mitigate their foreign currency exposure. The financial executives of these companies emphasised that the location of their production facilities depended on a number of important profitability considerations in addition to foreign currency exposure. For example, due to the scale economies enjoyed by those firms with highly capital intensive production processes, it is necessary to operate their production facilities at full capacity. Such companies are not willing to sacrifice the benefits they obtain from their economies of scale in order to adopt a flexible production policy to reduce the exchange rate sensitivity of their cash flows.

## 8.4 Summary and Conclusions

This chapter has described the findings of the follow-up interviews which were conducted with six of the postal survey respondents. The qualitative analysis of the economic currency exposures faced by the sample firms highlights the complexity involved in determining what the actual impact of a change in the value of a currency will be. For a given firm, the impact depends not only on the extent to which it sells its products and sources its inputs in foreign markets, but also on factors such as the location of its major competitors and the price sensitivity of its customers. While the postal surveys did elicit information on these factors, it was difficult to capture their relative significance using this methodology. As explained in chapter 6, this is because it is difficult, if not impossible, to generalise about the factors which cause the cash flows of companies to be highly sensitive to changes in foreign exchange rates. Nevertheless, the comparison of the currency exposure profiles of the sample companies based on the interview evidence with those based on the data obtained in the postal surveys suggests that the questionnaires provide a relatively accurate method of measuring economic currency exposure.

A further contribution of the follow-up interviews has been to show that the ability of companies to use operational hedging techniques is more restricted than the theoretical literature suggests. Most of the sample firms are unable to employ flexible production or sourcing policies in order to manage their economic currency exposure. In a number of cases this is because companies have little or no operating flexibility due to the existence of strong relationships with their suppliers, or the capital intensiveness of their industry. Other companies use commodity inputs with world market prices that are denominated in a single currency, irrespective of the supplier from which they are purchased. In these companies, the financial executives have to rely on financial hedging in order to protect their future cash flows from the adverse effects of foreign exchange rate movements.

## **CHAPTER NINE**

### **Conclusions**

It was not until the early 1970s that economic currency exposure was recognised as an important area of concern for companies operating in a world of volatile foreign exchange rates. Since then, the research which has focused on economic exposure has been largely theoretical. There exists little empirical evidence of the extent to which the cash flows of companies are sensitive to exchange rate movements, or the factors which cause economic exposure. The purpose of this chapter is to illustrate how the findings of the empirical research presented in this thesis contribute to the current knowledge of economic currency exposure. In addition, the possible avenues for future research in this field are discussed.

This thesis set out with three aims:

1. To examine the extent to which the cash flows of UK non-financial companies are sensitive to unexpected changes in foreign exchange rates.
2. To establish which company-specific factors which are important in determining the magnitude of a company's exchange rate sensitivity.
3. To investigate the extent to which UK companies attempt to mitigate their foreign currency exposure by making adjustments in their operating policies and strategies.

These aims were achieved through two large-scale postal surveys which were distributed to the finance directors of listed UK non-financial companies. Follow-up interviews conducted with some of the survey respondents provide further insights into the economic currency exposure of these firms.



## **9.1 The Contributions of the Research**

### **9.1.1 The nature of the economic currency exposure of UK companies**

According to the theory of economic currency exposure, movements in foreign exchange rates can affect the future cash flows of virtually every company involved either directly or indirectly in international trade. It has also been suggested that even those firms that do not source their inputs or sell their products in foreign markets experience some degree of economic currency exposure. This thesis has presented the findings of an empirical exploration of the impact of changes in foreign exchange rates on UK non-financial companies. Most of the previous research which has attempted to measure economic exposure has focused on US firms. The small number of studies which have been conducted in the UK has focused on samples of companies which are expected to have cash flows that are highly sensitive to changes in foreign exchange rates. For example Walsh (1986) investigated the economic exposure of UK multinational corporations, while Donnelly & Sheehy's (1996) research focused on significant exporting firms. The scope of this study is therefore wider than that of previous research, because the survey respondents include exporting, importing, and purely domestic firms, in addition to a number of large multinational corporations.

The survey findings suggest that, in general, the cash flows of UK non-financial companies are not as sensitive to movements in foreign exchange rates as they are conventionally thought to be. More than half of the respondents consider the cost and revenue cash flows of their company to be relatively insensitive to changes in foreign exchange rates. This is surprising, given that only 15 per cent of the sample companies do not source or sell in foreign markets. There is, however, a small proportion of the survey respondents who consider the cash flows of their companies to be extremely vulnerable to currency fluctuations.



The caveat is that the accuracy of the evidence presented in this thesis rests on the survey respondents' *perceptions* of the extent to which their companies are affected by movements in foreign exchange rates. By comparing the questionnaire responses obtained in the main survey to those obtained in the follow-up survey, we can obtain some reassurance that the respondents' estimates are accurate. This is because the second survey was distributed in early 1997, following a six month period of rapid appreciation in the value of sterling (up 15 per cent on a trade-weighted basis). At this time, many articles appeared in the financial press speculating about the impact of the appreciation on the profitability of UK companies. But despite this widespread press coverage, the exchange rate sensitivity ratings obtained from the respondents to the follow-up survey were broadly similar to those obtained in the main survey (which was distributed a year earlier, in 1996).

There are two factors which can explain why the cash flows of such a large proportion of UK companies are relatively insensitive to changes in foreign exchange rates. The first is that many of these firms have constructed a 'natural hedge' which reduces the magnitude of their economic currency exposure. The survey results show that of the sample companies that sell their products in foreign markets, more than 95 per cent also source at least some of their raw materials in foreign markets. The offsetting foreign currency cash inflows and outflows of such firms can reduce their overall sensitivity to changes in foreign exchange rates. Other surveyed companies have achieved natural hedges by setting up production facilities in foreign countries. By supplying an overseas customer from a factory located in the customer's own country, a company can reduce the level of its cross-border trade and ultimately, the magnitude of its foreign currency exposure.

A second explanation for the low levels of exchange rate sensitivity reported in this study is that the demand for the products and services exported by many UK firms is now less sensitive to changes in price. Those firms that export goods with a high level of value-added have a greater ability to 'pass-on' the impact of exchange rate changes to their foreign customers. This is because such products often command

higher profit margins than undifferentiated goods. Furthermore, foreign buyers may be unable to find alternative suppliers of specialised products. The anecdotal evidence obtained from the additional comments volunteered by some of the survey respondents provides support for this explanation.

The findings of this study appear to contradict the recent reports in the financial press which have highlighted the adverse impact of the strength of the pound on the profitability of many UK manufacturing companies. However, the companies that form the survey population examined in this thesis are large, publicly quoted companies, with an average annual turnover of £710m. Such firms are more likely to be protected from the effects of sterling's appreciation than the small and medium sized enterprises, which have been the focus of many of the press reports. This is because many large UK corporations have constructed natural hedges by operating foreign subsidiaries or by sourcing many of their inputs in foreign markets. They are also more likely to have diversified their export sales across many countries. Moreover, where these large firms have issued profits warnings due to the recent appreciation in sterling, they have often arisen out of their *translation* currency exposures as opposed to the cash flow effects of the strength of the pound.

### **9.1.2 The determinants of economic currency exposure**

The determinants of economic currency exposure may be classified as belonging to one of two categories. The *direct* sources arise from a company's involvement in foreign trade, while the *indirect* sources arise from the impact of foreign exchange rate movements on a company's customers, competitors and suppliers. Most of the previous studies of the determinants of economic exposure have focused on variables such as the percentage of foreign to total assets, turnover or profit. In addition to investigating these direct sources, this study examines the indirect sources of foreign exchange rate sensitivity. The findings presented in this thesis add to the contribution made by Walsh (1986) by considering the indirect sources of the

economic exposure experienced by a wide range of companies in addition to multinational corporations. The extent to which a company may reduce its economic currency exposure by constructing natural hedges is also considered.

The survey findings confirm the results of previous research by demonstrating that there is a positive association between the magnitude of a company's foreign operations and its economic exposure. It is shown that there is a positive relationship between the foreign exchange rate sensitivity of the sample companies' cash flows and the extent to which they sell, source, produce, or finance in foreign markets. There is also evidence to suggest that those companies which construct natural hedges by sourcing their inputs and selling their products in foreign markets can reduce their overall economic currency exposure.

Based on the evidence obtained from the postal surveys, the indirect sources of economic exposure appear to be less important than the direct sources in the determination of the exchange rate sensitivity of UK non-financial firms. Of the four indirect sources investigated in this study, two are found to be significantly related to the exchange rate sensitivity ratings estimated by the survey respondents. Specifically, it is shown that the magnitude of a company's economic currency exposure is positively related to the proportion of its competitors that are based in foreign countries. In addition, the extent to which the demand for a company's products is sensitive to changes in price is found to be positively related to the exchange rate sensitivity of its sales volumes. Further support for the importance of the competitive sources of economic exposure was obtained from the follow-up interviews which were conducted with some of the survey respondents.

The qualitative evidence obtained in the interviews also shows that the determination of economic currency exposure is more complicated than Flood & Lessard's (1986) model suggests. In particular, their framework ignores the second order effects which this study finds to be very important. A movement in foreign exchange rates may alter a company's competitiveness as a result of the direct impact on the cash

flows of competitors, rather than on the cash flows of the company itself. A company may also be indirectly exposed to currency movements as a result of the exchange rate sensitivity of its customers. Given the relative importance of such competitive sources of economic exposure, it is not altogether surprising that the logit models presented in chapter 6 of this thesis were unable to predict those companies with cash flows that are very sensitive to exchange rate movements. The indirect sources of economic exposure are highly company-specific. They are therefore difficult to measure accurately using a questionnaire-based approach. In this context, the use of semi-structured interviews was a valuable methodology for investigating the significance of the competitive sources of exchange rate sensitivity.

These findings have two significant implications for the financial executives of UK companies attempting to assess the extent to which their future cash flows are exposed to fluctuations in foreign exchange rates. The first is that measuring a company's economic currency exposure is a highly complex task. In order to form an accurate assessment, it is necessary to consider not only the level of the company's involvement in foreign markets, but also the nature of its competitive environment. The second implication of these findings is that constructing natural hedges can reduce economic currency exposure. By adjusting the currency mix of its sales and inputs, it may be possible for a company to neutralise at least the *direct* effects of changes in exchange rates on its cash flows.

### **9.1.3 The management of economic currency exposure**

The survey research reported in this thesis provides an up-to-date picture of the extent to which UK companies make adjustments in their operating policies and strategies in order to reduce the exchange rate sensitivity of their cash flows. This evidence suggests that UK firms are now taking a more sophisticated approach to the management of their long-term economic currency exposure. The proportion of the sample companies using operational hedging techniques is greater than that reported



by previous UK research. Moreover, the survey findings show that UK exporters are now more willing to absorb the adverse effects of foreign exchange rate movements in their profit margins in order to protect their long term market share.

The most widely used operational hedging techniques investigated in this study share two common characteristics. Firstly, they are largely *proactive* diversification or matching strategies, rather than strategies requiring *reactive* shifts in the location of production or sourcing in response to foreign exchange rate movements. In particular, approximately two thirds of the survey respondents reported the use of foreign currency denominated debt, and a similar proportion stated that their company sources inputs in the same currencies it receives for its sales. These techniques are designed to neutralise the impact of foreign exchange rate changes on the cash flows of a company. The second characteristic of the most popular techniques is that they offer significant benefits in addition to reducing a company's currency exposure. For example, by locating production facilities in the same countries as sales are made, a company may be able to reduce its transportation costs or take advantage of lower labour costs in addition to reducing its currency exposure.

In contrast to the widespread use of proactive operational hedging techniques, most of the sample companies are unwilling to shift production between plants located in different countries or move to alternative sources of inputs in order to mitigate their foreign currency exposure. This is probably because few companies possess the operating flexibility necessary to adopt these policies. Some support for this explanation is provided by the qualitative information obtained in the follow-up interviews. This evidence highlights three main barriers which may prevent a company from employing flexible production and sourcing policies for the management of its economic exposure. First, a flexible production approach is not an ideal method of reducing economic exposure for those firms with capital intensive production processes. The reduction in the scale economies of such companies due to the employment of a flexible production policy would probably outweigh any benefits arising from the reduced exchange rate sensitivity of their cash flows.

A second barrier is faced by those companies which have little or no choice regarding the currencies in which their inputs are denominated. Companies using inputs which are priced in world markets and are denominated in a single currency (such as US dollars) are unable to reduce their economic currency exposure by adopting a flexible sourcing policy. This constraint on the use of a flexible sourcing policy is likely to become more widespread as the markets for traded goods become increasingly global. A third barrier affects those companies which have strong relationships with their suppliers and require inputs of constant high quality. Such firms are often unwilling to sacrifice these relationships in order to pursue a flexible sourcing policy to reduce their foreign currency exposure. However, if such relationships are mutually important, a company may be in a position to mitigate its currency exposure by insisting that its foreign suppliers make compensating adjustments in their prices. This could involve the company and its suppliers agreeing to share the losses (or benefits) arising from currency fluctuations.

The reluctance of the companies examined in this study to alter their foreign currency prices following the recent appreciation in sterling contradicts the earlier findings of Hague *et al* (1974) and Williamson (1990). These researchers have criticised UK exporters for passing on most of the effects of exchange rate movements to their customers by altering foreign currency prices or by invoicing in sterling. In contrast, the survey results presented in this thesis show that UK exporters are now more willing to absorb the adverse effects of foreign exchange rate movements in their profit margins in order to protect their long term market share. Moreover, the proportion of the sample companies which report invoicing their foreign customers in sterling is considerably lower than that reported in previous studies. This provides further evidence of an increased level of sophistication in the approach taken by UK non-financial companies to the management of their long term economic currency exposure.

## **9.2 Avenues for Further Research**

The empirical research conducted for this thesis represents one of the most comprehensive surveys of the economic currency exposure faced by large UK companies. Further empirical investigation of the exchange rate sensitivity of small and medium sized UK firms is now required. This is because the large corporations examined in this study are likely to have a greater ability to mitigate their currency exposure through the construction of natural hedges. It is therefore likely that smaller UK firms are more vulnerable to the effects of foreign exchange rate movements.

The methodology used to measure the economic exposure faced by the companies in this study is based on the subjective assessments of financial executives. Further research is needed in order to develop a more objective method of assessing economic currency exposure. This could involve the use of regression analysis to study the relationship between the operating cash flows of the firm and changes in foreign exchange rates. Due to the financial hedging activities of many companies, it is likely that a lagged rather than a contemporaneous relationship would be found. A factor complicating the use of this methodology is the widespread use of operational hedging techniques by UK firms. It may therefore be necessary to include variables in the regression analysis which measure the extent to which a company has constructed natural hedges.

This thesis has provided a starting point for the analysis of the indirect determinants of economic currency exposure. Further research is clearly necessary in order to specify the precise mechanisms through which foreign exchange rate movements affect the cash flows of UK companies. An interview based approach may be needed in order to fully explain the complex relationship between the competitive environment in which a company operates and the magnitude of its economic currency exposure. In particular, there is a need for further research to focus on the



extent to which import penetration, arising as a result of an appreciation in the value of sterling, affects the domestic sales revenues of UK firms.

A final avenue for further research concerns the pricing reactions of UK firms to a depreciation in the value of sterling. The evidence presented in this thesis suggests that UK firms are reluctant to pass on the effects of an appreciation in sterling to their foreign customers. It is not known, however, whether these companies would take a symmetrical approach to a depreciation in sterling. Would UK companies choose to reduce the foreign currency prices of their products in order to increase market share, or would they react to a depreciation in their home currency by maintaining their foreign currency prices and increasing their short-term profit margins? Of course a depreciation in sterling from its current high level would be necessary before such a study could take place.

In conclusion, this thesis has highlighted the considerable difficulties associated with measuring and managing the impact of foreign exchange rate movements on the future cash flows of the firm. Although at present there is a dearth of empirical research on economic currency exposure, continued foreign exchange rate volatility combined with increasing levels of internationalisation by companies will inevitably lead to an increase in the level of research activity in this field.

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## **APPENDIX A**

### **Postal Questionnaires and Correspondence**

[Cover letter used in 1996 postal survey]



DEPARTMENT *of* BUSINESS STUDIES

The University of Edinburgh  
William Robertson Building  
50 George Square  
Edinburgh EH8 9JY

Fax 0131 668 3053

Telephone 0131 650 1000

or direct dial 0131 650

26 February 1996

[Name of Finance Director]

[Company Address]

Dear [name of Finance Director]

I am a doctoral student in the Department of Business Studies at the University of Edinburgh. For my thesis, I am investigating the foreign exchange risk management practices of British industrial and commercial companies under the supervision of Dr Peter Moles.

I would be grateful if you could spare a little of your time to complete the enclosed questionnaire, by ticking the box or boxes which most accurately describe your company. If you feel a question is not applicable to your company, please indicate this in the space provided, or leave that question blank. Please complete this questionnaire even if your company does not have any foreign currency denominated receipts or payments.

Once you have completed it, please place the questionnaire in the reply-paid envelope and post it back to me as soon as possible. Alternatively, you may fax the questionnaire to me on (0131) 668 3053. If you have any queries, please contact me by fax on (0131) 668 3053.

All responses will be strictly confidential. If you wish to have a summarised copy of the survey results, please indicate this on your reply.

Thank you very much for your co-operation.

Yours sincerely

Katrina Bradley  
Doctoral Student

# FOREIGN EXCHANGE RISK MANAGEMENT QUESTIONNAIRE

## Part A: The Effect of Exchange Rate Movements on your Company

1. Has your company experienced any of the following effects of the recent weakening of Pound Sterling relative to other major currencies?

*[Please tick one box for each of a) to f).]*

	<i>Yes</i>	<i>No</i>	<i>Not Applicable</i>
a) Increased <b>costs</b> of <b>foreign sourced inputs</b> (e.g. plant, raw material and labour costs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Increased <b>debt servicing costs</b> of <b>foreign</b> currency denominated debt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Increased <b>sales volumes</b> in the <b>domestic UK</b> market, due to reduced competitiveness of foreign imports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Increased <b>profit margins</b> on sales in the <b>domestic UK</b> market, due to reduced competitiveness of foreign imports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Increased <b>sales volumes</b> in <b>export</b> markets, due to increased competitiveness of your company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Increased <b>profit margins</b> on <b>sales</b> in <b>export</b> markets, due to increased competitiveness of your company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. How sensitive to changes in foreign exchange rates do you consider your company's sales volumes, profit margins and costs to be?

*[Please tick the box on the following scale which most adequately reflects the position of your company for each of a), b) and c)].*

	<i>Highly Insensitive</i> <i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>Highly Sensitive</i> <i>5</i>
a) Sales Volumes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Profit Margins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Part B: Foreign Exchange Risk Management Practices of Your Company

3. Which of the following techniques does your company use **primarily** for the management of foreign exchange risk? *[Please tick the box for each of a) to i) which most adequately reflects the extent to which your company uses each technique]*

	Often	Occasionally	Never
a) Sourcing inputs in the same currencies as sales are made	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Sourcing inputs in the same currencies as major competitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Altering the country from which inputs are sourced, following movements in foreign exchange rates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Locating production in the same countries as sales are made	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Locating production/operations in the same countries as competitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Altering the country in which production/operations occur, following movements in foreign exchange rates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Foreign currency denominated debt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Diversifying sales in many different currencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i) Differentiating your company's product/s to avoid direct price competition with foreign competitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j) Other strategy <i>[Please specify]</i> _____			

4. Does your company forecast its future foreign currency cash flows? *[Please Tick One]*

No  
☐

Yes  
☐

*[Go to question 5]*

For what time horizons are these forecasts made?  
*[Please Tick one]*

Up to one week	<input type="checkbox"/>
Up to two weeks	<input type="checkbox"/>
Up to one month	<input type="checkbox"/>
Up to one year	<input type="checkbox"/>
Greater than one year	<input type="checkbox"/>



5. Are foreign exchange risk management considerations incorporated in the decision making process by the operating departments (such as sales, marketing and production) in your company?  
[Please tick the box which most accurately describes your company on the following scale]

<i>Always</i>	<i>Usually</i>	<i>Often</i>	<i>Occasionally</i>	<i>Never</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Do you attempt to manage 'economic exposure' i.e. the risk that movements in exchange rates will damage your company's competitive position by leading to changes in market prices for your company's products and inputs?

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
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### Part C: The Characteristics of Your Company

7. The following questions concern the nature of the markets in which your company operates.  
[For parts a) to i), please tick the box which most accurately describes your company]

- a) What percentage of your company's **sales** are made in **foreign** (non UK) markets?

No					
Foreign Sales	1-20 %	21-40 %	41-60 %	61-80 %	81-100 %
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- b) What percentage of your company's **inputs** are purchased in **foreign** (non UK) markets?

No					
Foreign inputs	1-20 %	21-40 %	41-60 %	61-80 %	81-100 %
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- c) What percentage of your company's key **competitors** are based in **foreign** (non UK) countries?

No foreign					
Competitors	1-20 %	21-40 %	41-60 %	61-80 %	81-100 %
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- d) What percentage of your company's **production** occurs within **foreign** (non UK) countries?

No foreign					
Production	1-20 %	21-40 %	41-60 %	61-80 %	81-100 %
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- e) What percentage of your company's **debt** is denominated in **foreign** currencies?

No					
Foreign Debt	1-20 %	21-40 %	41-60 %	61-80 %	81-100 %
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

f) What percentage of your company's main competitors face costs denominated in the same currencies as your company?

0-20%

☐

21-40%

☐

41-60%

☐

61-80%

☐

81-100%

☐

g) How sensitive is the demand for your company's main product/s to changes in price?

*Insensitive*

☐

*Slightly  
Insensitive*

☐

*Neutral*

☐

*Slightly  
Sensitive*

☐

*Sensitive*

☐

h) To what extent are the product/s sold by your company differentiated from those of your competitors? *[Please rate your company on the following scale of differentiation]*

*Highly  
Undifferentiated*

1

☐

2

☐

3

☐

4

☐

*Highly  
Differentiated*

5

☐

i) Are the prices for your company's product/s regulated by price controls?

Yes

☐

No

☐

Would you be willing to provide feedback on this questionnaire if contacted?

Yes

☐

No

☐

*[If yes, please attach your business card so that you can be contacted]*

Please add any further comments you may have

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Thank you very much. Please return your questionnaire in the pre-paid envelope provided to:

*Katrina Bradley*

*The Department of Business Studies*

*The University of Edinburgh*

*William Robertson Building, 50 George Square*

*EDINBURGH EH8 9JY*

Or fax your completed questionnaire to (0131) 668 3053

[Follow-up letter sent to non-respondents in 1996 postal survey]



DEPARTMENT of BUSINESS STUDIES

The University of Edinburgh  
William Robertson Building  
50 George Square  
Edinburgh EH8 9JY

Fax 0131 668 3053

Telephone 0131 650 1000

or direct dial 0131 650

11 March 1996

[Name of Finance Director]

[Company Address]

Dear [Name of Finance Director]

Recently I wrote to you requesting your assistance in completing a questionnaire for my doctoral research investigating corporate foreign exchange risk management practice.

At the time of writing, I have not received a completed questionnaire from you. If your reply has crossed this letter in the post, please disregard this letter. If you have not already done so, I would be grateful if you could spare a little of your time to complete the enclosed questionnaire, by ticking the box or boxes which most accurately describe your company. If you feel a question is not applicable to your company, please indicate in the space provided, or leave the question blank. Please complete this questionnaire even if your company does not have any foreign currency receipts or payments, or you consider that your company is not affected by currency fluctuations.

Once you have completed it, please place the questionnaire in the reply-paid envelope and post it back to me as soon as possible. Alternatively, you may fax the questionnaire to me on (0131) 668 3053. If you have any queries, please contact me by fax on (0131) 668 3053.

All responses will be strictly confidential. If you wish to have a summarised copy of the survey results, please indicate this on your reply.

Thank you very much for your co-operation.

Yours sincerely

Katrina Bradley  
Doctoral Student



DEPARTMENT of BUSINESS STUDIES

The University of Edinburgh  
William Robertson Building  
50 George Square  
Edinburgh EH8 9JY

Fax 0131 668 3053

Telephone 0131 650 1000

or direct dial 0131 650

31 March 1997

[Name of Finance Director]

[Company Address]

Dear [Name of Finance Director]

A year ago you kindly responded to a foreign exchange risk management questionnaire which I sent to you as part of my doctoral research at the University of Edinburgh. This survey was very successful and I have gained a valuable insight into the relationship between corporate performance and foreign exchange rates. A brief summary of the results is enclosed.

You will be aware that there has been a considerable appreciation in sterling over the past few months. I am interested to discover how this has affected your company. I would therefore be grateful if you could spare a little of your time to complete the enclosed follow-up questionnaire. Please complete this questionnaire even if your company does not have any foreign currency denominated receipts or payments.

Once you have completed it, please place the questionnaire in the reply-paid envelope and post it back to me as soon as possible. Alternatively, you may fax the questionnaire to me on (0131) 668 3053. If you have any queries, please contact me by phone on (0131) 650 4014 or by email at: [katrina@srv1.ems.ed.ac.uk](mailto:katrina@srv1.ems.ed.ac.uk)

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## Foreign Exchange Risk Management Survey - Executive Summary

*In March 1996, a questionnaire was sent to the finance directors of approximately 600 listed industrial and commercial companies (irrespective of international involvement), resulting in a response rate of 51%.*

### **The impact of exchange rate movements on corporate performance**

A key aspect examined by the survey was the impact of the relative weakness in sterling on the responding companies.

- 60% of companies had experienced an increase in the cost of foreign sourced inputs.
- Improved export sales volumes and increased profit margins on exports were reported by approximately one third of respondents.
- Domestic sales appeared relatively unaffected by sterling depreciation - fewer than 10% of companies reported improved domestic profit margins and 12% improved domestic sales volumes.
- Many respondents see their cash flows as being relatively insensitive to exchange rate movements. On a five point scale ('1' being highly insensitive), more than 50% of respondents rated the exchange rate sensitivity of their sales volumes, profit margins and costs as a '1' or '2'.

### **Operating policies and currency risk management**

The survey also examined the extent to which companies adapt operating policies to manage currency risk.

- The operating strategies used most frequently by respondents to manage currency risk were those of sourcing inputs in the same currencies as sales are made (69%) and foreign currency denominated debt (65%).
- In almost 40% of the responding companies, foreign exchange risk management considerations are regularly incorporated in the decisions made by operating departments.

### **Implications for financial management**

- Companies are generally beginning to identify the direct impacts of exchange rate movements on their longer term cash flows, in addition to the short term accounting effects.
- The competitive risks arising when a company is exposed to a particular currency even when it has no significant cash flows in that currency are not as widely recognised. Many financial managers appear unaware of the indirect impact of exchange rate movements on the competitive position of their companies.
- The limitations of financial hedging are recognised by an increasing number of companies, who are beginning to manage currency risk by making structural adjustments in their sourcing and production methods.
- A significant number of companies continue to rely solely on financial hedging or invoicing in sterling in order to reduce currency exposure. Such strategies do not protect the firm from the long term impacts of exchange rate movements on competitive position.

*If you would like a more detailed analysis of the survey results, please contact Katrina Bradley by telephone on (0131) 650 4104, or by email at: [katrina@srv1.ems.ed.ac.uk](mailto:katrina@srv1.ems.ed.ac.uk)*

# FOREIGN EXCHANGE RISK MANAGEMENT QUESTIONNAIRE

1. Has your company experienced any of the following effects of the recent appreciation in Sterling relative to other major currencies?

*[Please tick one box for each of a) to g).]*

	<i>Yes</i>	<i>No</i>	<i>Not Applicable</i>
a) Decreased <b>costs</b> of <b>foreign sourced inputs</b> (e.g. plant, labour and raw material costs).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Decreased <b>costs</b> of <b>domestic sourced inputs</b> (e.g. plant, labour and raw material costs).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Decreased <b>debt servicing costs</b> of <b>foreign</b> currency denominated debt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Decreased <b>sales volumes</b> in <b>export</b> markets, due to reduced competitiveness of your company.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) Decreased <b>profit margins</b> on sales in <b>export</b> markets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Decreased <b>sales volumes</b> in the <b>domestic</b> UK market, due to increased competitiveness of foreign imports.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Decreased <b>profit margins</b> on <b>sales</b> in the <b>domestic</b> UK market due to increased competitiveness of foreign imports.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) Other <i>[please specify]</i> _____			

2. How sensitive to changes in foreign exchange rates do you consider your company's sales volumes, profit margins and costs to be?

*[Please tick one box on the following scale for each of a), b) and c)].*

	<i>Highly Insensitive</i> <i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>Highly Sensitive</i> <i>5</i>
a) Sales Volumes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Profit Margins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Following an appreciation in sterling, British exporters are often faced with a trade-off between **sales volumes** and **profit margins**. Which of the following best describes the reaction of your company to the **appreciation** in sterling which has occurred recently?  
*[Please tick one of the following]*

- a) Our company does not export from Britain. *[Please go to question five]* ☐
- b) Keep sterling prices **constant** (increase foreign currency prices) to preserve profit margins. ☐
- c) **Reduce** sterling prices to the full extent of the appreciation (keep foreign currency prices constant) and sacrifice profit margins. ☐
- d) **Reduce** sterling prices, but not to the full extent of the appreciation. ☐
- e) Other *[please specify]* \_\_\_\_\_  
\_\_\_\_\_

4. In which currency does your company generally invoice its **exports**?  
*[Please tick one of the following]*

- a) Sterling ☐
- b) The domestic currency of the buyer ☐
- c) Other *[please specify]* \_\_\_\_\_  
\_\_\_\_\_

5. Please add any further comments regarding the impact of exchange rates on your company

Thank you very much. Please return your questionnaire in the pre-paid envelope provided to:

*Katrina Bradley*  
*The Department of Business Studies, University of Edinburgh*  
*William Robertson Building, 50 George Square*  
*EDINBURGH EH8 9JY*

Or fax your completed questionnaire to (0131) 668 3053



[Follow-up letter sent to non-respondents in 1997 postal survey]



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Edinburgh EH8 9JY

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Telephone 0131 650 1000

or direct dial 0131 650

11 April 1997

[Name of Finance Director]

[Company Address]

Dear [Name of Finance Director]

Recently I wrote to you requesting your assistance in completing a follow-up questionnaire for my doctoral research investigating corporate foreign exchange risk management practice.

At the time of writing, I have not received a completed questionnaire from you. If your reply has crossed this letter in the post, please disregard this letter. If you have not already done so, I would be grateful if you could spare a little of your time to complete the enclosed questionnaire.

Once you have completed it, please place the questionnaire in the reply-paid envelope and post it back to me as soon as possible. Alternatively, you may fax the questionnaire to me on (0131) 668 3053. If you have any queries, please contact me by telephone on (0131) 650 4014 or by email at: [katrina@srv1.ems.ed.ac.uk](mailto:katrina@srv1.ems.ed.ac.uk)

All responses will be strictly confidential. If you wish to have a summarised copy of the survey results, please indicate this on your reply.

Thank you very much for your co-operation.

Yours sincerely

Katrina Bradley  
Doctoral Student

## **APPENDIX B**

### **Interview Correspondence and Transcripts**

[Letter used to arrange follow-up interviews]



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The University of Edinburgh  
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Edinburgh EH8 9JY

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16 September 1997

[Name of Finance Director]

[Company Address]

Dear [Name of Finance Director],

In the past 18 months you have kindly participated in two surveys regarding foreign exchange risk management that I have distributed as part of my doctoral research at Edinburgh University. Your contribution to my research is greatly appreciated.

My research focuses on the *competitive* currency exposure faced by UK companies. This relates to the impact of changes in foreign exchange rates on the revenues and costs of a company and ultimately, its competitive position. My survey findings clearly illustrate that there is no one 'best practice' for the management of this type of currency exposure, as each company's situation is different. Therefore, I feel that my understanding of this topic would benefit greatly from a discussion with you about the currency exposure experienced by [Company Name].

I will be visiting London on October 27 - 29 and I was wondering if you would be available to meet with me at this time. I have enclosed a summary of the topics I would like to discuss with you. This should take approximately 30 - 45 minutes. Any information you give me will be treated with the strictest confidence and the names of individual companies will not be identified in my research report.

I will contact you by telephone on September 22 and, should you agree to participate, I will arrange a suitable time for my visit. In the meantime, should you have any queries, I can be contacted by telephone on (0131) 650 4104 or by email at [katrina.bradley@ed.ac.uk](mailto:katrina.bradley@ed.ac.uk). Once again, I would like to thank you for your valuable contribution to my research.

Yours sincerely

Katrina Bradley  
Doctoral Student

# **PRACTICAL ASPECTS OF COMPETITIVE CURRENCY EXPOSURE: TOPICS FOR DISCUSSION**

**Katrina Bradley  
Department of Business Studies  
The University of Edinburgh**

## **1. The Effects of the Recent Appreciation in Sterling**

Over the past year, sterling has appreciated by approximately 20% on a trade-weighted basis.

- Many companies have had to choose between maintaining prices (in sterling terms) and losing foreign market share to competitors, or cutting prices and sacrificing profit margins to retain foreign sales. How has your company approached this decision?
- To what extent has the appreciation affected the conversion of the earnings of your foreign subsidiaries? (i.e. the 'translation' effect)
- Has your company's competitive position in the UK market been affected by the increased price competitiveness of foreign imports?
- Has your company experienced a reduction in the prices of its foreign sourced raw materials or other inputs?

## **2. Your Company's Operations in Foreign Markets**

- Why does your company sell and/or purchase raw materials in foreign markets?
- To what extent does your company operate in overseas markets through foreign subsidiaries?
- What is the nature of these subsidiaries? i.e. production or sales subsidiaries.

## **3. The Nature of Your Company's Competitive Environment**

- To what extent does your company face competition from non-UK companies in its foreign selling markets?
- To what extent does your company face competition in its UK selling markets?
- Are your competitors affected in a similar way by movements in foreign exchange rates?

## **4. The Management of Your Company's Currency Exposure**

It may be possible to make adjustments in the operating policies of a company in order to manage currency exposure. Changing the location of production facilities, matching the currencies of costs with the currencies of revenues and altering the countries in which raw materials are purchased are examples of operational hedging techniques.

- To what extent is your company able to use such methods for managing currency exposure?
- What factors limit the ability of your company to adopt such operational means of managing currency exposure?
- Do you think such currency risk management methods are more or less effective than financial hedging? (for example, the use of forward foreign exchange contracts.)

## **Transcript of Interview with the Chief Economist at Speciality Chemicals\* plc held on 27 October 1997**

**Interviewer:** What are the main types of products your company produces?

**Interviewee:** We produce man-made fibres, coatings, sealants and paints.

**Interviewer:** Where does your production mainly occur?

**Interviewee:** Production occurs in 29 foreign countries, and we have operations in about 45 - sales or distribution companies. Major areas of production are Europe, US, Far East.

Approx. 40% of production in UK, 25% in Continental Europe, 25% in US, and 10% in the Far East. European production is in Sweden, Spain, Italy, Germany, so it's fairly well spread across the continent. It varies by product. There are significant differences in the ease with which one can operate in certain countries. By far, most of production in Europe occurs with in the UK, but that is not reflected in sales. At the moment, only 15% of sales are in UK and 30 - 35% in Continental Europe.

**Interviewer:** To what extent are sales made across national boundaries?

**Interviewee:** Europe is not yet a single market ..... the barriers have come down a lot, but the national differences are such that we often have to supply locally. Nevertheless, a lot of our stuff is for sale across Europe.

**Interviewer:** What is the nature of your operations in foreign countries:

**Interviewee:** It is a mixture of foreign subsidiaries and foreign production plants. The company is organised as about 15 different businesses. The business are grouped according to the kind of products and report therefore to a main board director. The way the businesses are run varies..... it relates to the characteristics of the industry they are in. The coatings businesses are run almost without exception on a matrix structure. So you have local management in the area in question, and the others aren't operated that way. Fibres are run by the fibre, but that is because fibres tend to be much more globalised markets. There is a certain amount of geographic proximity, but there is also some specialisation by product.

Currency exposure is managed by the treasury. We operate a 100% hedging policy. It is actually a dismissable offence not to hedge a future transaction exposure.

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\* Name of company disguised for confidentiality purposes

**Interviewer:** To what extent does your company compete on price?

**Interviewee:** We try not to. In practice, the level of competition these days is so high that you sometimes have to. Nearly all fibres are price sensitive. But they are price sensitive within the characteristics of the fibre in question. We have a new fibre for instance, called Tencel. Of course the price is affected by competing fibres at some point. But really the demand for products like Tencel is relatively immune to changes in price. The demand for mainstream fibres like viscose and acrylic are quite sensitive to changes in price. For most product we try to differentiate them and sell on their characteristics and base sales on our relationship with the customer, so service is very important.

As an example, we are the sole supplier to Colgate of toothpaste tubes in the US. With our aerospace sealants division, we are the 100% supplier to Boeing of aerospace sealants. The sealants have to perform extremely well under rigorous conditions. On the other hand, we can command very high prices because it's not worth Boeing's while going through the 5 year accreditation process which the regulations demand to accredit a different supplier. The other side of the coin for us is that we devote a lot of effort to research and development.

**Interviewer:** What is the relative size of your market share within your foreign markets?

**Interviewee:** The actual market shares are not easy to calculate. In aerospace sealants we have a worldwide market share of 80%. We are the number one supplier. Our market share in Western Europe is 93%

Aerospace coatings - the paint that goes on the planes for protection - the main manufacture of that is done in the US. And there is a plant in the North of England and another one in France. We have 40% of the world market.

In Coatings, marine coatings, we are the market leader worldwide - 33 - 40% of the market. In Yacht paints we have 40% of world market and we are the market leader. Protective coatings is a much more fragmented market. We are number one, but our market share is only about 14%.

Packaging is much more difficult to measure. We are number two in the UK and number two in the US and in Europe.

Fibres. For Tencel, our market share is just under 100%. For viscose, we are number three, in acrylics we are number two.

Our objective in fibres is to be either number one or number two in what ever sector we operate. Our objective in coatings is to be global if possible.

**Interviewer:** What proportion of your revenue is generated in foreign markets?

**Interviewee:** Approximately 85% of turnover is made in foreign markets. More than 50% of UK turnover is exported.

**Interviewer:** What is the nature of your competition in your foreign markets?

**Interviewee:** they are mainly worldwide companies. Mainly large European companies or major US firms. In Asia and Japan, the competition is mainly local.

**Interviewer:** Do you face substantial foreign competition in UK market?

**Interviewee:** It is actually not a terribly important market. As an example, the movement of dollar relative to DEM recently affected two of our businesses in particular. Firstly, our production of filter tips for cigarettes using cellulose acetate tow. All production takes place in UK or Europe. UK production is either sold in the UK in Europe. That which is sold in UK is processed and then exported to continental Europe as cigarettes. So all of it is sensitive to exchange rates. It is an odd market in that it is priced in dollars because the big two companies in it are US firms. What was to the rest of the world a strong dollar was to the UK a weak dollar which reduced our margins. We couldn't change prices because our market share is important so we just had to take a hit on the chin.

Secondly, Tencel fibre. Japan is a very strong market for Tencel. It is manufactured in the US, not in Europe. Sales are priced in Yen. When the Yen depreciated, there was immediately transaction effect from Japan to the US. Profits are remitted to the UK from the States. The dollar was strong against the Yen, but weak against Sterling. We suffered because the sales coming back were reduced by the position in Japan. Also the repatriated profits to the UK were reduced because of the strength of sterling.

**Interviewer:** Do you think most of your competitors are affected in a similar way by changes in foreign exchange rates?

**Interviewee:** The ones in the UK are. In the UK it is difficult to pick out main competitors. Company xxxxx has certainly suffered, to a much greater extent than we have against the DEM. The fact we have operations on the continent, particularly in Germany means that we can offset to some extent, in the books I mean, the effect in the UK.

**Interviewer:** Why does your company choose to sell its products in foreign markets?



**Interviewee:** We have no choice really. The UK market is not large enough, only 306m out of total sales of 2,100m, we wouldn't last long!

**Interviewer:** Is your company concerned about its translation exposure?

**Interviewee:** The translation effect is immediate ..... it doesn't actually concern us in managing the company the problem we have is that it concerns the city because it affects the EPS and the dividend stream and of course the profit before tax.

**Interviewer:** Do you attempt to manage your translation exposure?

**Interviewee:** No, we're very very cautious actually You can offset it to some extent by borrowing in the right place. We don't speculate. I would say as a company we have a fairly cautious approach to that, compared to many companies. It [translation exposure] can of course affect the cost of debt.

**Interviewer:** How has your company approached the trade-off between market share and declining margins due to sterling's appreciation?

**Interviewee:** In most of our markets we are concerned either to meet local competition or to defend market share. If you loose market share, it is very difficult to get it back. It is not impossible to get it back, but it's just hard work to get it back. Therefore we tend to price in local currency. Of course if the local currency is very strong as the yen was a year or two ago, then we benefit. The only time we might deviate from that is when the raw material price changes and you are faced with the prospect of making no profit. The flexibility we have is actually quite small and although I know technically you can use elasticity of demand and go up and down the curve a bit, in practice it doesn't work that way. It's a stepped change and you don't half feel it.

**Interviewer:** As a result of the strong pound have you attempted to invoice more of your sales in sterling?

**Interviewee:** It is not really an option.

**Interviewer:** Do you manage your future economic exposure?

**Interviewee:** We cover for trading transactions and that is a rule, you cannot undertake one without taking out cover. Of course if it goes the wrong way you lose on it, you've been too cautious then. But we have a long experience in this, and these rules have grown as a result of our experience.

**Interviewer:** Is your company able to adjust its operating policies to manage economic exposure?

**Interviewee:** You have far less flexibility than it would seem because you are more locked in than theory would suggest. Relationships with suppliers and customers are long term. What you can do is to take it into account in evolving your strategy both on the marketing side and the production side. More difficult with production because dealing with long time scales.

The US dollar went to 2.43 in 1980 - 82. Anyone who was working at that time in that sector understands exchange rates in a way that an awful lot of managers don't. One thing the fibres business did teach one if you had lived through that particular period, is the impact exchange rates can have. Managers who came up through other side of business not so aware. More so now, because of the Far Eastern situation.

**Interviewer:** Has your company made any changes to its operating policies as a result of the strong pound?

**Interviewee:** No changes in sourcing policies. It's happening in the Far East anyway because the markets have moved there. The reason we've got such a strong Far Eastern programme is not to do with exchange rates, it is because the shipbuilding industry moved there, so production plants have to follow. What happens in practice is that you just sort of take it on the chin. Theoretically if you had spare capacity you could make production shifts, but it's much more rigid than it seems.

Our operating policies are longer term. Hedging transactions is about three months. Most cover is 3 - 6 months. That is common across the board. You can postpone it. On the movement in sterling that we have had in last year, our profit forecast is down from £130m to £100m - approximately a 25% decline. Around 10% of this is the translation effect. The translation effect is easy to calculate. The transaction effect is difficult to estimate because we don't know how much business we have lost. It is almost entirely economic exposure.

**Transcript of Interview with the Finance Director of Edible Oils\***  
**plc held on 28 October 1997**

**Interviewer:** What are the main types of product produced by your company?

**Interviewee:** We produce edible oils and fats, including bulk refined oils for the industrial market and also edible oils and margarines for retailers.

**Interviewer:** Does any of your firm's production take place in foreign markets?

**Interviewee:** No, our production is located entirely within the UK.

**Interviewer:** Does your company own any foreign subsidiaries?

**Interviewee:** No, we have no material foreign subsidiaries. Our production almost entirely takes place within UK.

**Interviewer:** To what extent does your company sell its products in foreign markets?

**Interviewee:** Only a very small proportion of our revenue comes from foreign sales - approximately 5%. We are beginning to build up export sales for two reasons. Firstly, because it should be more profitable and secondly, because of the problem of import substitution.

Imports are a very minor part of the UK market by size. However, foreign importers still have a large impact, particularly those dumping or selling at marginal cost. Therefore if we have sales in foreign markets, we are in a position to say poke me in the eye and I'll poke you in the eye. The foreign importers therefore find out very quickly if they are being over aggressive in the UK market. But there are no unspoken agreements, it isn't a question of unspoken agreements.

Import substitution is a major problem for some British companies. It arises due to foreign importers selling within UK. By selling marginal product, and maybe small amounts of marginal product, they can nevertheless disrupt the market..... that's a major problem. As a result of the import substitution problem, we therefore prefer sterling to be low rather than high!

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\* Name of company disguised for confidentiality purposes

**Interviewer:** In which countries are your competitors based?

**Interviewee:** The competitors faced in foreign markets are from all over the world. In the UK, it is mainly other UK firms, but also some foreign importers.

**Interviewer:** To what extent does your company compete on price?

**Interviewee:** Heavily, it is a very sensitive market to price.

**Interviewer:** What is the relative size of your market share within the UK?

**Interviewee:** It is approximately 30 - 35%. Largest individual company within this sector by sales in the UK.

**Interviewer:** To what extent do you source your inputs in foreign markets?

**Interviewee:** All of our raw materials are sourced abroad. They include sun oil, fish oil, palm oil, rape seed oil, which are then refined. These raw materials represent approximately half of the production costs.

**Interviewer:** Are the prices for these oils world market prices?

**Interviewee:** Yes, in almost every case.

**Interviewer:** Are they priced in US dollars?

**Interviewee:** Some of them are.

**Interviewer:** To what extent then would you say that your competitors are affected in a similar way by changes in foreign exchange rates?

**Interviewee:** All of our competitors are sourcing crude oil from the same suppliers and are therefore all affected in a similar way by exchange rate changes.

**Interviewer:** What impact has the recent appreciation in sterling had on your company?

**Interviewee:** The weak Deutschmark is a problem. We buy the oil, but we then have to refine it, pack it.... if sterling is strong, therefore our conversion cost is

obviously going to be higher than that of European based firms. Sterling appreciation has decreased the costs of foreign sourced inputs, but within the UK market you are on a level pegging, there is no competitive advantage in that. We have no translation exposure of any substance.

**Interviewer:** How have you approached the trade-off between your profit margins and market share when faced with a strengthening pound?

**Interviewee:** Our problem is that we are in an industry where you want to run your production plants at maximum capacity.... therefore we maintain sales volumes until the pain is too great.

**Interviewer:** In which currency do you invoice your foreign sales - sterling or the currency of the buyer?

**Interviewee:** Foreign sales mostly invoiced in sterling. Yes, we will be invoicing presumably in the Euro.

**Interviewer:** Do you attempt to manage your company's long term economic exposure?

**Interviewee:** We are long on US dollars, which has an element of compensation for the appreciation in sterling. We could possibly purchase more packaging in foreign markets to take advantage of the appreciation in sterling. We are already purchasing more abroad. Obviously oils are already purchased abroad. Because oils are all priced in US dollars, it does not matter where they are purchased, therefore there is little to be gained from sourcing flexibility. We are now beginning to offset purchases in foreign currencies with foreign currency sales.

## **Transcript of Interview with Director of Treasury and Financial Services at Industrial Steel\* plc held on 29 October 1997**

**Interviewer:** What are the main types of products your company produces?

**Interviewee:** We produce a full range of steel products which are the raw material for manufacturing industry - so we sell directly to manufacturers such as automotive companies, steel fabricators and packaging manufacturers. We also sell to wholesalers that sell onwards usually in smaller amounts to smaller manufacturers.

We make beams, which are used in construction, wire rod which is used for wire drawing, screens, cables for suspension bridges and so on, plates which are used for construction and for making large tanks, ships and pipes. Also coil which is used in automotive and tin cans and for cladding for buildings and tubes which are used for carrying liquids and fluids and we also make a number of coated products which are used for can making and for domestic appliances.

**Interviewer:** Where does your production mainly occur?

**Interviewee:** Our production is based almost entirely within the UK. See page 55 of our annual report for details of our turnover by origin. Almost 70% of our turnover is originated in UK, 22% in other European countries and only 8% in the United States.

**Interviewer:** Do you own any foreign subsidiaries?

**Interviewee:** All of our overseas operations, representing around 30% of our total production are run as subsidiaries.

**Interviewer:** To what extent does your company compete on price?

**Interviewee:** No matter what steel producers do to try and make steel a bespoke product, it is essentially a commodity and therefore the market determines the price. Steel producers can do very little to influence market prices. There are factors which cause a rigidity in the marketplace like transport costs and tariff barriers etc, but generally speaking, the market determines the price. We have virtually no control over our selling prices outside the UK. Within the UK there is effectively a barrier there because of transport costs.

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\* Name of company disguised for confidentiality purposes

**Interviewer:** What is the relative size of your market share within the UK?

**Interviewee:** We have approximately 60% share of the UK market.

**Interviewer:** What is the relative size of your market share within your foreign markets?

**Interviewee:** In the world market for steel, we are the 3rd largest steel producer and the largest in Europe. Having said that, we are still very small in relation to world steel demand and this is one of the problems with the steel industry - there are far too many producers. World steel demand is something like 700m tonnes, even the largest producer with 25m tonnes is tiny in relation to that. If you contrast that with other industries you would find that the largest producer would probably have a market share of 20 - 30%. In our industry, you have Nippon Steel, which is the largest producer, with a world market share of about 3%. It is a very fragmented industry. In the European market, excluding the UK we have approximately 4% of the market share. In the European market including the UK it is about 11%.

**Interviewer:** What is the nature of your competition within the UK market - are your most significant competitors based in the UK or elsewhere?

**Interviewee:** Our main competitors are predominantly European producers but there is also a significant world trade and the import penetration to the market mainly comes through wholesalers (steel stockholders). There is also a lot of what is called 'steel tourism' - steel moves a lot. I think something like 40% of all steel produced in Europe crosses a national boundary - there is a lot of cross-border trade.

**Interviewer:** What is the nature of the inputs used in the steel making process and where are they sourced?

**Interviewee:** All raw materials are imported. All of them are bought in dollar markets. Approximately one quarter of our costs are related to the US dollar - see our annual report page 5. Our raw materials are iron ore and coal.

**Interviewer:** Have your raw material prices declined as a result of the appreciation in sterling?

**Interviewee:** To a certain degree. We probably have a balance in the dollar - approximately 20% of turnover is denominated in dollars while approximately 25% of our costs are dollar denominated. So we are almost in balance as far as the dollar is concerned. We are a net buyer of dollars. The dollar does not have a significant direct effect on us. It has indirect effect in so far as our continental competitors also



buy their raw materials in dollars so we are also interested in the Deutschmark:Dollar rate as well as the Sterling:Dollar rate.

**Interviewer:** Do you think that a high proportion of your competitors are affected in a similar way by movements in exchange rates?

**Interviewee:** They are all affected by exchange rates but it really depends upon their geographical base. We have virtually no UK competitors all of our competitors are from Europe or elsewhere. Therefore it depends upon the relativity of their exchange rates to our exchange rates. Within Europe, because Germany is the largest steel producing nation and it is also the largest steel consuming nation, Deutschmark prices tend to influence prices within all European markets, including the UK. So in the long term, all prices in steel in Europe are very heavily influenced by the level of the Deutschmark or by the prices which are charged for steel in Germany in Deutschmarks.

**Interviewer:** In my postal survey which you responded to six months ago, I asked you about the impact of sterling's appreciation on your company. Has there been any change in the effects you have listed?

**Interviewee:** They are all about the same as last survey. There is still a risk that the appreciation will have a depressing effect on our UK sales. As yet, the UK manufacturing industry hasn't really felt the brunt of the strength of the pound largely because the UK economy itself has been fairly strong. There is an article in the Financial Times this morning about the engineering employers association warning about the impact of sterling's appreciation on engineering firms, and of course, they are our customers. We have been expecting a reduction in demand for our products by UK customers and so far it hasn't but we still expect that to happen, and that could have quite a severe impact on us because our customers are in much the same position as we are. We export about half of our output and most of our customers export a high proportion of their output as well so if they're not able to export their goods then they will demand less steel from us. But as yet that hasn't happened.

**Interviewer:** Is your company concerned about the translation effect of the appreciation in sterling?

**Interviewee:** It is not a major problem, largely because in proportion to our total operations, our overseas operations are not that big and secondly because they've not been very profitable to start with, so it's not been a problem we've had to deal with.

**Interviewer:** How has your company approached the trade off between market share and profit margins in your foreign markets?

**Interviewee:** We are a price taker and this is one of the problems of the steel industry - there is an advantage in maintaining output at a high level, utilising capacity because the steel industry has very high fixed costs and therefore the marginal cost of production is relatively small and so all steel producers like to produce at their maximum possible output. And that means that when demand falls steel prices collapse.

**Interviewer:** Is there any limit to the fall in prices?

**Interviewee:** Now It really depends on the strength of the balance sheet of the company. In the past it has very much depended on whether Governments were prepared to subsidise the industry and that's been a major problem to the industry because the when steel prices have collapsed, Governments have propped up their steel prices by making state aid. That is much less likely to happen now, largely because a much greater proportion of the industry worldwide is in private sector hands. But it is certainly always a potential problem.

**Interviewer:** In what currencies does your company invoice its foreign sales?

**Interviewee:** In the UK it is sterling. In Continental Europe is the currency of the buyer. Anywhere else in the world it is dollars. A number of our customers are multinational companies and they would now like to be invoiced in Deutschmarks because that currency is so weak.

**Interviewer:** Does your company attempt to manage its economic currency exposure?

**Interviewee:** No. We certainly hedge our contracted cash flows. Our cash flows are typically contracted for 6 months in advance. We cannot hedge our customers' exposure. We do not attempt to hedge our uncontracted direct exposure, as that would only defer the effects and hedging has a cost as well and can itself create further exposures.

**Interviewer:** Do you have any flexibility to adjust your operating policies in order to mitigate your currency exposure?

**Interviewee:** Production shifting is not really possible. Largely because we have very small operations overseas. Even if we did have significant operations overseas, because of the cost structure which requires plants to be operated at high levels of utilisation there would be a disadvantage if we were to under-utilise any of our facilities. But certainly some of our customers are able to operate that sort of policy. We have customers which make oil drums for instance and one in particular has manufacturing facilities in the UK as well as manufacturing facilities on the

continent. When the pound is as strong as it is now, they stop producing in the UK and produce their oil drums in Rotterdam. In practice it is very difficult, largely because of the high fixed costs associated with establishing the plant and equipment.

We don't have sourcing flexibility either because we are buying from US dollar denominated markets. We can and do switch between geographical regions on a price basis but whatever we buy, we buy in dollars - we have no way of buying in any other currency. One of the interesting potential developments of European monetary union will be the possibility that there will be established a market for steel making raw materials in Euros. Because the Euro block is a very large importer of steel making raw materials and there will be the potential to establish a Euro steel making raw materials market.

**Interviewer:** How do you manage the currency exposure of your contracted cash flows?

**Interviewee:** Almost entirely through forward contracts. We do use options occasionally when we are quoting for a tender or where there is a contingent commitment.

**Interviewer:** Do you manage your company's translation exposure?

**Interviewee:** We hedge our exposure on overseas assets and generally it has been the practice in the past to hedge those by foreign currency loans. We are now changing that and we will in the future be using swaps. There is a reference to that in our annual report on page 12. The one major exposure that we don't hedge is our investment in xxxx which is our large Swedish investment and that is essentially because there is a natural hedge in place because the effect of exchange rate movements has a contrary effect on the performance of the company and therefore we feel it is not necessary. We do take account therefore of natural hedges when we are hedging our translation exposure.

## **Transcript of Interview with the Group Treasury Manager at London Leisurewear\* plc held on 29 October 1997**

**Interviewer:** What are the main types of products sold by your company?

**Interviewee:** Footwear, sportswear and leisurewear - they are usually branded products.

**Interviewer:** Where does production mainly occur?

**Interviewee:** Probably more than 60% of production is located in foreign countries. The footwear - probably the majority of the business - is produced either in either the Far East or Europe, the majority is in the Far East. Fashion clothing also is predominantly Far Eastern, but also some European. We do have some domestic production, but not much.

**Interviewer:** What is the nature of your foreign operations?

**Interviewee:** We don't actually have any production, we actually source it from other factories, so we have a sourcing operation out in Hong Kong and they will go to factories and arrange with them to produce the footwear, the apparel, so we have a range of factories that we use. That provides us with more flexibility in respect of changing markets both with respect to the product we want but also in terms of production. For instance a lot of shoes come from Indonesia, but that is quite a mature area, prices are rising, and we no longer get the duty breaks we used to get on that, so we are looking at new areas e.g. Vietnam.

**Interviewer:** To what extent does your company compete on price?

**Interviewee:** Our customers are price sensitive, but most of it is done on what we call price points - so say a basic leather trainer will retail at £30 so that is what the market price is. If the exchange rate moves up or down, that price will not change. So we will either will make extra margin or lower margin. Each range has different price points, so it isn't so much that it is sensitive to changes in exchange rates, what is sensitive is our ability to produce a shoe at that price point. If the dollar strengthened a lot, and we were finding that we had to buy at \$1.30 - \$1.40, we would either have to reduce our margins, or say that we can't produce a shoe for that price in the market. It is slightly different from some of the manufacturers who are producing products that are price sensitive. Prices of our products don't change, they are almost fixed. A standard pair of swimming trunks will be £9.99 then the next one

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\* Name of company disguised for confidentiality purposes

up will be £12.99 or whatever, so you're trying to hit those price points and within those price points you are competing in that you're trying to produce the best product within that price point, but you're not actually competing on price.

**Interviewer:** Has the recent appreciation in sterling increased your profit margins?

**Interviewee:** In certain areas we have, yes, but in certain other areas, some of the price points have moved, not appreciably. But basically yes, if you had to take a big general picture you would say that where sterling has appreciated now, we have been able to take advantage of some better margins. The price points in the market we perceive haven't moved that much at all. Where they might have moved is where we're going into new markets where our products are fairly specialised. The price points certainly haven't gone up recently, so you're not able to push up the prices over time.

**Interviewer:** What do you think will happen with respect to the price points if sterling continues to appreciate?

**Interviewee:** I think they would probably plateau. It really depends on the market, a price point would only move if somebody said because of this continued strength of sterling what we're doing is we're moving it [the price point] down. That would be the retailers or the large producers such as Nike and Adidas. If they moved the price points down then we would have to follow suit. It wouldn't be us just acting unilaterally - it would be in response to the market. And probably what you would find is that instead of the price points moving, you would get a better pair of shoes for the price. So whereas a shoe might have been £40, you might be able to price them at £45, so the price points are still there, but it's just the actual product you get for that is better.

**Interviewer:** What is the relative size of your market share within the UK?

**Interviewee:** It depends on the particular business, because we have got quite a few subsidiaries. We've got [subsidiary xxx], and also a company that sells unbranded shoes through places like M & S. So it's difficult to give an overall view because obviously some of them have got a reasonable share of the market and some of them have got nothing. On the footwear side, compared with people like Adidas and Nike we're very very small, but I think we're probably one of the biggest suppliers of places like Tesco, Asda, M & S.

**Interviewer:** What proportion of your company's total sales are made in foreign markets?

**Interviewee:** If we took the business overall and reverse that question and ask what proportion of the goods are made in the UK. Subsidiary xxx - a lot of their stuff is made in the UK. A lot of the swimwear is made here as well. But for everybody else, the majority is made abroad and brought back in the UK.

We have subsidiaries in various countries and you could find that say Subsidiary xxx in Germany will order through Subsidiary xxx in Nottingham but if it's Far Eastern produced products, they will actually be sent to them direct. So you have got a thing where there could be a brand which we sell in another country where we have subsidiaries, because a lot of our stuff is sold through licensees or distributors.

**Interviewer:** What proportion of your company's total revenue is generated in foreign markets?

**Interviewee:** Between 20 and 40%. It does change quite a bit. At the moment, it would probably be 25%.

**Interviewer:** What is the nature of your competition in foreign markets?

**Interviewee:** Mostly they will be foreign. On the sportswear side Adidas and Nike. On the swimwear side, Arena which are German. Most are foreign.

**Interviewer:** Do these foreign competitors face costs denominated in similar currencies?

**Interviewee:** Generally our competitors will source in the Far East. It is a natural source for most companies and I think you will find that most trainers are produced in the Far East. They've got the expertise, low costs etc. We also have in common with other companies, products produced in Europe and most of that is in Italy, Spain and Portugal who have a tradition of leather shoe making. You find that you will put your longer term orders in through the Far East but you've got such long lead times there because you're having to contact the factory get the samples done and then book space in the factory, it's quite a long cycle. Whereas with Europe, because a lot of them operate in small family run businesses, if you want an extra run of 7,000 pairs of shoes because that line is selling particularly well, you could go back to them and have a 3 - 6 week lead time, but it would be impossible to do that in the Far East. That is the way we work and that is replicated by a lot of companies. If you look at Company xxx, which is another company which we compete with, apparently all their products are produced in Portugal. As a whole in the industry, most of the products will come from the Far East - trainers and canvas shoes. If you're talking about leather shoes, they usually come from Europe.

So our competitors are probably affected in a similar way. If they're a US company, they're paying dollars and receiving dollars, so they've got a natural hedge. Where as



for us, a lot of our sales are in the UK, so we're having to sell sterling to get the dollars, so the exchange rate is probably more critical for us than say somebody like Nike. A lot of their sales will be US. So they've got a natural hedge. Traditionally in the Far East it has always been that you pay in dollars.

**Interviewer:** Are you concerned about the translation exposure of your company?

**Interviewee:** Up until recently, it is not something that they've tended to address here, but it is something that we are looking at now. We're not looking at it so much from the effect of profit from our overseas subsidiaries because the stage of the cycle that we are at the moment, there is not a great deal of cash generation going on in the overseas businesses, so it isn't a big issue at the moment - if anything we are funding them. And it's something that further down the line will be a more of a consideration because we will be getting cash in from them through dividends or whatever. We are looking at the translation effects on the balance sheet, but that hasn't run its course at the moment. At the moment we do it on a case by case basis. We don't tend to hedge.

**Interviewer:** Do you price your products sold in foreign markets in sterling or foreign currency?

**Interviewee:** It depends who it's for. What we have tended to do for some products is to price in dollars. So that if our businesses are sourcing in dollars they're selling in dollars as well, so it matches off their foreign exchange exposure and all we're left with is the margin. That really hasn't had an adverse effect. For other products we will price in the currency of the buyer. Normally we would say because we are a big company we have got the ability to hedge and we would price in our buyer's currency if it is felt that there is a competitive advantage in selling in that currency.

The decision to price in foreign currency has been reached on the basis that it's the best thing to do for the business because it makes it easier for them to sell and we should see an increase in sales from doing that and we wouldn't decide to switch back into sterling because of the problems with the exchange rate.

**Interviewer:** Do you attempt to manage your company's economic exposure?

**Interviewee:** Yes we do. Traditionally we used to just hedge firm commitments. Lately we have been extending that out - recognising that once the businesses have issued a price list, whether or not they have got any firm orders at that stage, they have got an exposure. So we've been stretching it out to price lists and now I'm stretching it out beyond that recognising that because of the way the market works with price points and it's not cost plus or anything like that, you've actually got a risk. Because if you're costing at say \$1.50, and at the moment it's \$1.65 well that's fine, you're making extra margin on that or whatever. It could actually mean that



we're able to produce a better shoe in that price point so in other words you're able to spend more on the shoe and still make the margin you want. So with extra margin a decision has to be made: do we keep it, do we spend it on marketing, or do we try and increase our market share by doing a better shoe.

If the rate went down to \$1.40, we would suffer reduced margins because we are costing at \$1.50. Now we would either have to simplify the shoe or just suffer the reduced margin. So that is why we are trying to cover further out, just to provide some certainty within the business. So much of the footwear business does go through the Far East, that it would be interesting to see what would happen if the dollar did strengthen quite a lot would that mean that price points across the board would go up?

**Interviewer:** How do you hedge your company's firm commitments?

**Interviewee:** Basically for a firm commitment it's 100% cover usually forward contracts, but we do use options for some of them. The same with the uncontracted cash flows - that is usually a mixture of forwards and options. If we're talking about a company like Subsidiary xxx, because they've been going a number of years, they've been showing steady growth, they're of a critical mass, we can look back and say over the last three years, this is how many US dollars we've purchased, so that gives you a ballpark figure of how much you would expect to do. Then we would say from that we would hedge a certain percentage depending on what the subsidiary predicts. If we look at some of the smaller brands which have been more erratic, we would say to them that we would take either a lower percentage cover, or use options to give flexibility, because you don't want to end up over hedged. It's a function of how we view the likelihood of the sales, the confidence in the company, the forecast of the exchange rate. So up until a couple of days ago, the forecasts were fairly negative for sterling, so we would take more through forwards than through options.

**Interviewer:** Is your company able to make adjustments in operating policies in order to manage its currency exposure?

**Interviewee:** It might be an option. It would have to be quite a considerable change to do that. I know that some bigger companies have done this and they change manufacturing base from one country to another, but we don't have any production ourselves because we're sourcing from factories so to some degree we've got infinite choice. However, the factories are all centred in the Far East, so that restricts our choice. I think if there was a serious appreciation of the dollar either they would have to relook at their prices or it may mean that on that basis, Europe is much more attractive and with Europe, they will only have a certain amount of capacity anyway, so they would take some time to catch up to the capacity we want, so it would be a fairly gradual process, but we haven't done that. There is no decision - OK we're going to this country because of the foreign exchange situation.

**Interviewer:** To what extent do your relationships with your suppliers prevent you from using sourcing flexibility to manage your currency exposure?

**Interviewee:** Where you've got a product like brand xxxx, there will be a couple of factories that produce a lot ... I wouldn't say we're locked in, but it's a sort of a mutual relationship in that we know that they can produce a shoe on time at the quality we want whenever we want and they know that they're going to get a constant source of orders. So something would have to go terribly wrong with the relationship for us to go elsewhere.

**Interviewer:** Do your suppliers pass on effect of movements in dollar relative to their currency?

**Interviewee:** They haven't so far. We have never had a situation where they are passing it through. They may have increased costs domestically, but there has been nothing overt about the exchange rate.

There are some countries where we have suppliers where they actually bill us in sterling like UAE, Middle East, Turkey and some European countries. That's all fine and dandy, but it is something that we are investigating because the concern is that if you look at Turkey for example, it has a weak currency, and so they're probably very happy to see sterling. If over a period of time, and they're billing in sterling, that's fine until the exchange rate moves adversely for them and then they may come to us to ask for a price increase. So in other words, when you look at it, you think you've avoided the foreign exchange exposure, but you haven't because they haven't their sophistication or haven't hedged and they come back to you and want an increased price. The obvious answer is to turn around and say no, that's not the agreement, but if they've got 10,000 pairs of shoes that you need, somewhere you're going to have to come to some agreement, whether it's meet in the middle or whatever. It is very difficult to quantify. Is it better sometimes to say we'll just be billed in your currency and then be certain that we've hedged it.

The Euro is going to be a disadvantage because basically it opens up the market to a lot of companies that wouldn't necessarily get involved in foreign exports. Smaller businesses that were restricted in their export growth because of the fact that they didn't want to take on any exchange rate risk. With the Euro, they can enter the market. We're of a size that we can handle foreign exchange risk and we can keep other companies out.

## **Transcript of Interview with the Group Treasury Manager at UK Energy\* plc held on 29 October 1997**

**Interviewer:** What is the nature of your company's operations?

**Interviewee:** We operate in approximately 12 different countries worldwide. Our primary activity is extraction and development of oil and gas for sale in an unrefined form. Therefore we are called an upstream company we don't have any downstream refining operations as such.

**Interviewer:** To what extent do you operate in foreign markets?

**Interviewee:** We are a UK based company. We report in sterling. However we have a substantial investor base in the US. Therefore we have reporting requirements in the US as well for US equity and debt investors. So there in itself you have a moot point as to whether we are a US or a UK company.

We have got both exploration acreages around the world and development and production so really there are three parts of the economic cycle of an upstream development scenario. All three are represented in the company's portfolio of assets. We have substantial explorations. Obviously as you prove that there is oil under the ground you go into the development phase where you go through heavy expenditure setting up plant and then you get into the production phase where you are actually realising the value of your investment. These are long term investment cycles and therefore the decisions you take are very much on a long term. Typically 10 years or so to actually start exploring right the way through to getting the fruits of that exploration.

The countries where we are active - North Sea UK, we have both oil and gas. Gas in the UK is predominantly priced in sterling when it is sold onshore UK. Or for export it can be priced in different currencies. The currency contracts are going to be linked to DEM or whatever, depending where you sell. Gas tends to be longer term developments, they tend to extract the gas more slowly and actually you have a much longer payback period for your investment on Gas.

We have substantial interests in fields which service liquid natural gas generating facilities in Indonesia, we've got oil production in Columbia and exploration in Columbia, gas production in Pakistan, we've got a development going on in Italy and we've got substantial discoveries in Algeria. So we are quite diverse around the world. And all the time we're looking to invest elsewhere as well.

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\* Name of company disguised for confidentiality purposes

**Interviewer:** Are your overseas operations run as foreign subsidiaries?

**Interviewee:** They can either be subsidiaries - companies in their own right, or they can be branches of UK subsidiaries. The set up is dependent on the size of the operation and the tax considerations of setting up the investing entity and also the joint venture arrangements. Because we are a very capital intensive business, a lot of our businesses are set up as joint ventures with other partners. We run a centralised head office here a number of our functions are centralised, such as the treasury function, and then we have got regional facilities which are really operating units that might have, depending on their size, different degrees of autonomy in terms of their local activities.

**Interviewer:** What proportion of your production and exploration activities take place within the UK?

**Interviewee:** Roughly 40% of the company's operations are in the UK

**Interviewer:** Would you regard your company as a price taker?

**Interviewee:** The commodity price for let's say oil, is internationally set, so yes we are certainly not big enough in any sense to affect the market. So in that sense we are. Whether we take that price based on actual spot sales today or under a long term contract based on an index linked formula, fundamentally you are a price taker.

**Interviewer:** Do you export from the UK?

**Interviewee:** Yes, we have got loading terminals in the west, where in fact the oil that is lifted, alongside our larger joint venture partners is shipped out all over the world.

**Interviewer:** Do you export from your international operations?

**Interviewee:** In the north sea, we can either have gas production in the north sea that is dedicated say for sale to a particular party who has agreed on a long term basis to buy the gas in the north sea or alternatively we've got cargoes of oil which are sold on a monthly basis and it really just depends where we find a buyer for it at the time. Where as in Indonesia, liquid natural gas is transported in huge ships. In order to actually secure the investment in that, what you do is you have to initially have a long term sales contract for gas and so our Indonesian production is in fact pre-sold to various Far Eastern, Japanese and Korean utilities who buy typically for the generation of electricity. So quite a lot of the Indonesian production is exported.



**Interviewer:** What is the nature of the competition you face in your foreign markets?

**Interviewee:** We compete to get licence to explore and develop a particular piece of acreage and we are competing with other oil companies for us to get an equity stake in that piece of acreage or in that development and therefore we would get some economic rent from that particular investment. When we come to actually sell, there is a commodity price, there is a market in the sale of crude and I guess on a month on month basis we are maybe in the dealings on the phone line competing with someone else, but it's not competition in the same sense. Our competition happens way before you come to actually sell. Remember, oil is a national asset, when you go to a country the oil under the ground, generally the Government has a right to it, and you're asking the Government to give you a share in return for you investing in that.

**Interviewer:** Would you agree, therefore, that most of your competitors affected in the same way as your company by changes in foreign exchange rates?

**Interviewee:** An upstream oil company I would say generally is. A lot depends to the level of the split of products that they sell. If they have got a lot of gas they're selling in the North Sea in sterling they're obviously not as much as someone who is selling a lot of black oil. Black oil is priced in dollars, irrespective of whether your exporting or selling in the UK. So there, primary economic exposure if you're a sterling company is in fact to the value of the dollar sterling exchange rate and the commodity price itself. So there are two risks there you have to manage.

**Interviewer:** What has been the impact of the appreciation in sterling on your firm?

**Interviewee:** Less sterling for your dollars. If you take an asset that is denominated in dollars and it is going to take you 10 years to realise the value of that asset you have got to determine the actual currency of that asset is it a dollar asset. Let's say it is going to generate most of its revenues in dollars. One of the ways in which we match or manage the economic exposure of that asset is actually by borrowing in dollars. So therefore in fact to the extent that the economic value of that asset has fallen so has the economic value of the liabilities associated with that asset. So matched currency funding is a way of managing long term economic exposure, to the extent that you can, to the extent that it actually makes sense to go out and borrow in dollars.

If you get short term fluctuations and the dollar strengthens, of course the short term effect is going to be very much different to the longer term effect. What happens is the crude that we've sold this year, we've actually got less sterling equivalent with the stronger sterling than we would have otherwise done. What can you do about that on a short term transactions basis? The argument for forward locking your exchange rates is a very difficult one because at what rate do you forward lock I mean is that a good rate or a bad rate? You very rapidly enter the speculation game which in fact is

not what your shareholders expect of you. So we will be adversely affected on our short term current production. That will to an extent be offset by the level of dollar denominated costs that we have and the level of dollar denominated borrowing. Any surplus exposure in dollars is probably less than you might imagine by looking at our gross production.

**Interviewer:** Are you concerned about your company's translation exposure?

**Interviewee:** You can manage that on the translation of your net assets by having net dollar borrowing which then affects your gearing levels of course. And of course the value of your overseas profits is also diminished when converted into sterling. The celebrated example is that of RTZ which is actually turning round to all of their bankers and saying look we only report in sterling, it doesn't mean that our assets are all in sterling.

So we are concerned, yes, in that it affects our reporting profits but I guess we have to educate the market and say look it's not necessarily a sterling asset as such, but I think we are some way from getting that message across to the market. It's not just the view of the city, it's the understanding of the shareholder. The shareholder understands that his share price is affected by a certain reporting parameter, whether you like it or not. He understands that that reported number is not going to deviate because you have locked certain things or you have got certain exposures out of the way. He at least understands what his risk exposure is. If you were to turn around and say we're going to be totally open to dollar-sterling the shareholder then understands what his exposure is he or she can therefore manage their portfolio accordingly. But in the absence of a radical step like that, then it's actually a question of getting out into the market and understanding the trend on the basis on which people invest their money.

**Interviewer:** Have you attempted to invoice more of your company's gas in sterling as a result of the appreciation?

**Interviewee:** In the UK it is generally priced in sterling so we are not changing anything there. What I guess would be a factor would be whether you would enter into a development based on your view of whether the currency exposure of that development is too great. I would say generally currency exposure is not a major factor in whether you want to take on a development or not. There are far more important factors such as the base commodity price, the cost, the taxation, political risks.

**Interviewer:** Do you use any financial instruments to manage your future cash flows?

**Interviewee:** Yes, we can do. We do from time to time do that. Clearly, a lot depends on the type of treasury department you are. We are not a risk taker at the same time we're not totally passive so within well defined criteria there is some element of forward selling, just maybe to get a little bit of certainty going out, or alternatively, if you see some short term fluctuations and you need to know what you're going to get next month. By and large I would say we are not large scale forward sellers, generally it's sold pretty much spot. No currency options. We are not a marginal case, we are vastly long on dollars on oil and we are not at the margin. We've got a risk, put in some contract, remove the risk. Or alternatively, if you're a company that is very stretched financially maybe you can't afford any of these fluctuations, otherwise you're going to go bust, then you really do have to lock in the commodity and fx, but we're not at that level either.

**Interviewer:** Do you have any operating flexibility to manage currency risk?

**Interviewee:** You could potentially negotiate your contracts such that within a contract you pass on currency risk to a particular contractor, or you could choose a different contractor altogether so there is some, maybe not a huge amount because if you find a lot of oil in a particular country you could theoretically say I will try and sell that oil in a different currency, but you pay for that, you lose value in doing that because you are transferring the risk to someone else. You could determine the currency of the expenditures but then maybe there aren't that many contractors who can do the job for you. You can always move a particular risk like a currency risk by as you're saying but at a cost, so if you said to a contractor bill me everything in sterling say, then a) I'm not sure that reduces the risk, and b) they may well charge you for that and that increases your costs.



## **Transcript of Interview with Group Treasury Manager of Scottish Woollens\* plc held on 17 November 1997**

**Interviewer:** What are the main types of products produced by your company?

**Interviewee:** The main part of group is knitwear, like Brand z. We then have other businesses that feed into that, we have fibres and yarns which basically get the raw cashmere or the raw lambswool and convert it into a yarn that can be used by a knitter. We also have subsidiaries in England. Some of our businesses export up to 90% of their goods. Our single biggest subsidiary is based in the US. This specialises in the likes of thermal underwear or ski clothing. But that is very much a US based business, so from that point of view it's not an importer or an exporter. It does everything in the States - it buys and sells in the States. But from a UK point of view, it obviously gives us an issue in the sense that we have to translate their profits, although we don't actually remit them, so it's very much a translation issue. We have a UK based carpet business. It buys lambswool, but this is usually denominated in sterling because it is buying from middlemen. Then it sells into UK markets, so it's very much a domestic business.

**Interviewer:** To what extent do you compete on price?

**Interviewee:** Within the knitwear there are three distinct brands - there is Brand x and Brand y and Brand z. Brand z is very much the lower end of the brand. It does about 50% of its business in the UK. Brands x and y export about 90% of their output. They have different price structures for each country. Our main competitors when it comes to cashmere are really the Italians. You have to bear in mind their prices relative to our prices. Brands x and y don't really sell much in the UK. And what they do sell in the UK tends to be in London to tourists. Their jumpers cost £300-£400 each. Brand z sells at £50 - £100. This brand has a lot more competition from UK firms e.g. Sweater Shop, who tend to be mainly UK based. Therefore in the UK market there is not a great deal of competition from foreign importers. But Brand z does export over 50% primarily to Germany, Japan and Poland and the competition could be Italian or Austrian. You have to break it down into each subsidiary. Subsidiary a, which is the source of a lot of our cashmere, is based in China. Our competition is co-operatives in China. For every single market we say what is the maximum price we can charge for our products and that is the price that we go for. We invoice in currency because we basically try and make it easy for the people that we are selling to.

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\* Name of company disguised for confidentiality purposes

**Interviewer:** To what extent is your production based in foreign markets?

**Interviewee:** We have a US subsidiary, and production in China. We have a 25% interest in a joint venture in China and that does a lot of manufacturing of cashmere garments. Primarily sold into China itself, Japan and into the US. Particularly the US, because Brands x, y and z cannot compete price wise in the US. The Americans just quite simply won't pay that much. The only way to get a cheaper product is to have a lower labour content. Brand z has a very small amount of cashmere garments made in China - approximately .1%. This was specific range for a specific market. Our Chinese joint venture doesn't impact on any way on our UK based operations. China will get more and more important for us. The world's best cashmere comes from China. There is only so much land in Inner Mongolia that can support the goats, so you can't just keep breeding more goats. It is a scarce resource. It is coming down in price, even the Chinese themselves want cashmere. It is a scarce source with a growing demand. So what we're trying to do by being in China is guarantee our source. Financially our operations in China aren't large.

**Interviewer:** Was your decision to manufacture in China anything to do with currency exposure?

**Interviewee:** Our decision to manufacture in China was to guarantee the source of supply.

**Interviewer:** What is your company's approximate market share in each of its markets?

**Interviewee:** Brand z is one of the top half dozen knitwear names. In this brand we have 10 - 15% market share. For Brands x and y we tend to be larger than Italian firms which tend to have smaller operations. There is no one bigger than Brand x in cashmere. We are probably the biggest player in each of the markets we are in, but there can still be lots of other players - it's far from a monopoly situation. Particularly in the States - Brand b has 40 - 50% of the market.

**Interviewer:** What proportion of your total sales are made in foreign markets?

**Interviewee:** Our total group turnover is £300m, of which £100m turnover by our US subsidiary. The UK part of the group has about £200m turnover and at least half of this is exported. The exports are sold through agents which are paid a commission on sales. The one exception is that Brand z in Germany has a sales and marketing operation.

**Interviewer:** What proportion of your inputs are sourced in foreign markets?

**Interviewee:** If you take Brands x and y, the biggest cost component is cashmere and that all comes from China. If you take Brand z, all the lambswool comes from Aussie or New Zealand. Although wool is purchased in Aussie dollars or New Zealand dollars, it's ultimately dollars which is dollar related. Cashmere is all dollar denominated. Therefore the main costs we have tend to be dollar based. All our manufacturing costs are in the UK.

**Interviewer:** To what extent are your competitors in your UK market affected in a similar way by exchange rate changes?

**Interviewee:** They are affected in a similar way. A lot of them picked up marginally on the positive side in the sense that cashmere has come down. Cashmere is a very volatile commodity anyway, it is a dollar based commodity anyway, so it goes up and down and then you have the exchange rate on top of that. So quite often the cashmere price can go up, but because the dollar has weakened, the sterling price just stays the same. Lambswool - we are all in the same boat as are our main competitors in Italy and Austria and places like that - their costs are basically dollar denominated, so the main comfort that we've had recently is that although the European currencies have depreciated quite markedly against sterling, and we are less competitive, at least these guys are having to start using more expensive raw materials which is helping a bit. We would much rather see it the other way, but our competitors' input costs are the same, they are dollar based. The next biggest cost is labour which is UK based. Some competitors have labour costs arising in the Far East. The exchange has helped them in that respect. Having said that, they have more expensive labour markets in the first place because of social costs.

In a woollen jumper, raw materials account for 25% of total costs. In a cashmere garment, the cashmere represents 75% of total costs. So therefore a weak dollar, which is what we've got at the moment can significantly help Brand x because cashmere is such an important raw material to them, that it can have a dramatic impact. Where as in Brand z, it is far less because labour costs are more important.

**Interviewer:** How have you approached the trade-off between market share and profit margins following the strength of sterling?

**Interviewee:** What we tend to do initially is invoice in foreign currency. We determine what is the maximum price that this market can take. So we very much drive it from what is that price and then we come back to the sterling. Unless we find that it doesn't give an acceptable margin. So what we've actually done is we've increased prices more than we normally would have to try and compensate. Sterling has moved 25% in some of our markets, so we've actually seen a double hit and we are particularly concerned about next year, whereby we've taken a hit on the margin to try and keep some sales, but we've put up margins a certain amount and now we're

seeing volumes coming down as well because the markets we sell into like Europe, and Japan, their economies are no where near as buoyant as we are in the UK. Knitwear is a good that people can do without so our margins have been squeezed. Some of our subsidiaries have taken a margin squeeze in an attempt to keep their volume in the hope that sterling would come back. But that hasn't happened. So the problem is a double hit, the volumes are down and the margins are down. This is why Brand z laid off 290 people off. There is no great hope in the short term.

**Interviewer:** How has the appreciation in sterling affected the value of your domestic sales to tourists? Has there been any fall in revenue?

**Interviewee:** Yes, definitely, because firstly, there are less tourists coming in and secondly they're not spending as much. Yen is now at over 200 which is a very important market for Brand x. Having said that, the margin on a Brand x jumper is 40 or 50% anyway - they can afford to lose some margin. Brand z has 25 - 30% tops and they can afford to lose some margin, but not that much. Basically the pound is killing us, and the warm weather is hurting us as well. What cashmere we sell in the UK is pretty marginal. With Brand z, there isn't a huge amount of foreign competition.

**Interviewer:** Are you concerned about the translation effect on your firm?

**Interviewee:** What we do do is that if you look at the US assets, that is 75% hedged by US dollar debt in the parent company. We are hedged on that. On the P&L side, because we are paying interest on dollars, we've got this interest exposure in the UK group. With the dollar weakening, our US dollar profits are less, but having said that, so is the interest payment. It's far from a perfect match, but it mitigates the pain. The board made the decision that we will not hedge the translation effect on P & L. People who invest in our firm are investing in a company that has more than half of its earnings in the US and on that basis we assume that they have bought the stock knowing that, so we don't hedge it. Cash flows we do hedge.

**Interviewer:** Have you attempted to invoice more of foreign sales in sterling?

**Interviewee:** I don't see how that helps because at the end of the day, the customer has still got to pay. You are asking customers to take the risk of sterling. We also sometimes find that the customer then tries to pay you in currency at a rate they've determined to be reasonable, and you haven't hedged it. Brand z now invoices in sterling in Japan and that is because the distributor has said that I'll take the exchange risk and you invoice me in sterling. That must have cost him a fortune because that was when sterling was at 190 and it is now at 200.

You are taking your exchange risks away if you get paid in sterling, but at the end of the day what you are trying to do is maximise your sales in any one country and I



reckon the best way to do that is to invoice in local currency. Yes you're taking the exposure away, but if you've lost sales you're not being too smart so I don't think that's any solution. The customer is king. You want to try and satisfy the customer. At the end of the day, everything is driven down to, let's try and make it as easy for these guys to pay us as possible.

**Interviewer:** Do you attempt to manage the currency exposure of your uncontracted future cash flows?

**Interviewee:** Yes, we use forward contracts. The knitters will issue price lists, probably first week in January for Autumn 1998 which is for delivery from July through to December 1998. We've got a board policy saying that by the time the price lists go out, we will have hedged 75% of the expected currency receipts. You move from 75% to 100% as you go through the season. This can occur because sales don't materialise as much as you thought or if orders are going well you may increase it. So you have a progressive increase. The spinners don't issue price lists, they tend to be more short term. Their price lists change a lot more. So therefore we are not hedging as far in advance. We do do some, to give them a little bit of certainty. Autumn 1997 was hedged before Christmas. It's a rolling thing. We source a lot from Hong Kong and Italy, so there's some good news there, but we also have subsidiaries who sell a lot in Hong Kong and Italy. We do all that sort of matching. We are never less than 75%. The big variable becomes how good are the forecasts you've used. Over the last 6 months they have probably been over optimistic on the sales which means in reality, we've not been 75%, we've been 85% which in a funny sense has been better for a currency point of view because we've been hedged at better rates. That's why in the last year and this year, currency has hurt us, but no where near as much as if we hadn't hedged. This year we might do less by way of forwards, but use some options, but will still use 50% on forwards.

**Interviewer:** Do you have any flexibility to adjust operating policies to manage your currency exposure?

**Interviewee:** We are a big exporter, but one of the things we can do is that we can source more in Hong Kong which is dollar denominated, also in Italy. Can use this as an opportunity to buy in HK etc, which makes the pain a little bit less. No one in their right mind would actually put a production plant in France or Germany. The social costs are so large.

You can only hedge so far ahead and our hedging for next year is going to be at current rates now, which is 25% greater than a year ago. This year we've had a 10-15% price increase, and we are looking at another 10-15% next year.

## **APPENDIX C**

### **Additional Statistical Information**

**Table C.1: The Exchange Rate Sensitivity of Sales Volumes by Industry**  
*[Source: Main Survey Responses and Extel Company Research Database]*

Industry	Number of Respondents (n = 295)	Sensitivity Ratings				
		'1'	'2'	'3'	'4'	'5'
<b>Utilities</b>	<b>15</b>	<b>11</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>
Electricity	7	6	1			
Gas Distribution	1	1				
Telecommunications	3	2		1		
Water	4	2	2			
<b>Services</b>	<b>112</b>	<b>56</b>	<b>29</b>	<b>18</b>	<b>7</b>	<b>2</b>
Distributors	14	5	4	5		
Leisure & Hotels	14	4	5	3	2	
Media	21	15	3	3		
Other Services & Businesses	3	2		1		
Retailers, Food	3	2	1			
Retailers, General	21	10	6	4	1	
Support Services	24	10	9	1	2	2
Transport	12	8	1	1	2	
<b>Consumer Goods</b>	<b>35</b>	<b>12</b>	<b>14</b>	<b>8</b>	<b>0</b>	<b>1</b>
Breweries	1		1			
Food Producers	10	4	3	3		
Health Care	8	4	3	1		
Household Goods	5		4			1
Pharmaceuticals	6	3	1	2		
Spirits, Wines & Ciders	5	1	2	2		
<b>General Industrials</b>	<b>116</b>	<b>24</b>	<b>26</b>	<b>44</b>	<b>19</b>	<b>3</b>
Building & Construction	11	8	1	1	1	
Building Mats. & Merchants	12	4	3	4		1
Chemicals	9	2	1	4	2	
Diversified Industrials	5	2	1	2		
Electronic & Elec. Equipment	17	2	6	7	2	
Engineering	37	2	11	13	10	1
Engineering, Vehicles	3			3		
Paper, Packaging & Printing	15	2	2	7	3	1
Textiles & Apparel	7	2	1	3	1	
<b>Mineral Extraction</b>	<b>14</b>	<b>8</b>	<b>4</b>		<b>1</b>	<b>1</b>
Extractive Industries	6	2	3		1	
Oil Exploration & Production	8	6	1			1



**Table C.2: The Exchange Rate Sensitivity of Profit Margins by Industry**  
*[Source: Main Survey Responses and Extel Company Research Database]*

Industry	Number of Respondents (n = 295)	Sensitivity Ratings				
		'1'	'2'	'3'	'4'	'5'
<b>Utilities</b>	<b>15</b>	<b>9</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>0</b>
Electricity	7	5	2			
Gas Distribution	1			1		
Telecommunications	3	2			1	
Water	4	2	2			
<b>Services</b>	<b>112</b>	<b>44</b>	<b>30</b>	<b>20</b>	<b>14</b>	<b>4</b>
Distributors	14	5	3	4	1	1
Leisure & Hotels	14	4	6	2	1	1
Media	21	12	4	3	2	
Other Services & Businesses	3	2		1		
Retailers, Food	3	2	1			
Retailers, General	21	2	8	8	3	
Support Services	24	11	6	1	4	2
Transport	12	6	2	1	3	
<b>Consumer Goods</b>	<b>35</b>	<b>4</b>	<b>13</b>	<b>9</b>	<b>6</b>	<b>3</b>
Breweries	1		1			
Food Producers	10	1	3	2	4	
Health Care	8	3	1	2	1	1
Household Goods	5		2	2		1
Pharmaceuticals	6		3	1	1	1
Spirits, Wines & Ciders	5		3	2		
<b>General Industrials</b>	<b>117</b>	<b>17</b>	<b>25</b>	<b>38</b>	<b>29</b>	<b>8</b>
Building & Construction	11	6	3	1	1	
Building Mats. & Merchants	13	3	3	4	1	2
Chemicals	9	1	2	1	3	2
Diversified Industrials	5	2	1	2		
Electronic & Elec. Equipment	17	1	4	5	7	
Engineering	37	1	8	15	9	4
Engineering, Vehicles	3			2	1	
Paper, Packaging & Printing	15	2	3	5	5	
Textiles & Apparel	7	1	1	3	2	
<b>Mineral Extraction</b>	<b>14</b>	<b>1</b>	<b>2</b>	<b>6</b>	<b>2</b>	<b>3</b>
Extractive Industries	6		2	2	1	1
Oil Exploration & Production	8	1		4	1	2

**Table C.3: The Exchange Rate Sensitivity of Costs by Industry**  
*[Source: Main Survey Responses and Extel Company Research Database]*

Industry	Number of Respondents (n = 295)	Sensitivity Ratings				
		'1'	'2'	'3'	'4'	'5'
<b>Utilities</b>	<b>15</b>	<b>10</b>	<b>3</b>		<b>2</b>	
Electricity	7	5	2			
Gas Distribution	1				1	
Telecommunications	3	2			1	
Water	4	3	1			
<b>Services</b>	<b>111</b>	<b>54</b>	<b>24</b>	<b>19</b>	<b>11</b>	<b>3</b>
Distributors	13	5	3	3	2	
Leisure & Hotels	14	8	2	2	1	1
Media	21	11	6	3	1	
Other Services & Businesses	3	2		1		
Retailers, Food	3	2	1			
Retailers, General	21	8	5	6	2	
Support Services	24	11	6	3	2	2
Transport	12	7	1	1	3	
<b>Consumer Goods</b>	<b>35</b>	<b>7</b>	<b>4</b>	<b>11</b>	<b>10</b>	<b>3</b>
Breweries	1		1			
Food Producers	10	2	1	1	5	1
Health Care	8	3		3	2	
Household Goods	5		1	2	1	1
Pharmaceuticals	6	2	1	3		
Spirits, Wines & Ciders	5			2	2	1
<b>General Industrials</b>	<b>117</b>	<b>16</b>	<b>34</b>	<b>46</b>	<b>15</b>	<b>6</b>
Building & Construction	11	4	4	2	1	
Building Mats. & Merchants	13	5	5		1	2
Chemicals	9	1	4	2	1	1
Diversified Industrials	5	2		3		
Electronic & Elec. Equipment	18	2	7	6	3	
Engineering	36	1	11	18	4	2
Engineering, Vehicles	3			2	1	
Paper, Packaging & Printing	15		3	8	3	1
Textiles & Apparel	7	1		5	1	
<b>Mineral Extraction</b>	<b>14</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>4</b>
Extractive Industries	6		2	1		3
Oil Exploration & Production	8	3	1	2	1	1

**Table C.4: What Percentage of Your Company's Key Competitors are Based in Foreign Countries?**

*[Source: Main Survey Responses]*

<b>Response Category</b>	<b>Number (%) of respondents [N = 298]</b>
No foreign competitors	64 (22%)
1 - 20% foreign competitors	69 (23%)
21 - 40% foreign competitors	28 (9%)
41 - 60% foreign competitors	37 (12%)
61 - 80% foreign competitors	56 (17%)
81 - 100% foreign competitors	35 (12%)
Not Answered	15 (5%)

**Table C.5: What Percentage of Your Company's Main Competitors Face Costs Denominated in the Same Currencies as Your Company?**

*[Source: Main Survey Responses]*

<b>Response Category</b>	<b>Number (%) of respondents [N = 298]</b>
1 - 20% of competitors	61 (21%)
21 - 40% of competitors	33 (11%)
41 - 60% of competitors	31 (10%)
61 - 80% of competitors	57 (19%)
81 - 100% of competitors	83 (28%)
Not Answered	32 (11%)

**Table C.6: How Sensitive is the Demand for Your Company's Main Product/s to Changes in Price?**

*[Source: Main Survey Responses]*

<b>Response Category</b>	<b>Number (%) of respondents [N = 298]</b>
Insensitive	26 (9%)
Slightly Insensitive	25 (9%)
Neutral	30 (10%)
Slightly Sensitive	99 (33%)
Sensitive	111 (37%)
Not Answered	7 (2%)

**Table C.7: To What Extent Are the Product/s Sold by Your Company Differentiated From Those of Your Competitors?**

*[Source: Main Survey Responses]*

<b>Response Category</b>	<b>Number (%) of respondents [N = 298]</b>
1 (highly undifferentiated)	46 (15%)
2	49 (16%)
3	101 (34%)
4	69 (23%)
5 (highly differentiated)	25 (8%)
Not Answered	8 (3%)